

# Science AMA Series: We're explosives scientists at Los Alamos National Laboratory in New Mexico, Ask Us Anything!

Los-Alamos-NL <sup>1</sup> and r/Science AMAs<sup>1</sup>

<sup>1</sup>Affiliation not available

April 17, 2023

[REDDIT](#)

## Science AMA Series: We're explosives scientists at Los Alamos National Laboratory in New Mexico, Ask Us Anything!

LOS-ALAMOS-NL [R/SCIENCE](#)

[removed]

[READ REVIEWS](#)

[WRITE A REVIEW](#)

### CORRESPONDENCE:

#### DATE RECEIVED:

March 22, 2016

#### DOI:

10.15200/winn.145856.60197

#### ARCHIVED:

March 21, 2016

#### CITATION:

Los-Alamos-NL , r/Science , Science AMA Series: We're explosives scientists at Los Alamos National Laboratory in New Mexico, Ask Us Anything!, *The Winnower* 3:e145856.60197 , 2016 , DOI: [10.15200/winn.145856.60197](https://doi.org/10.15200/winn.145856.60197)

© et al. This article is distributed under the terms of the [Creative Commons Attribution 4.0 International License](#), which permits unrestricted use, distribution, and redistribution in any medium, provided that the original author and source are credited.



Are there any substances you just will not work with?

Stuff that might reveal exciting science, but also scares you with instability and/ or explosive power?

This question is sort of a rip off of Derek Lowe's blog, a list of incredibly deadly poisons and ridiculously explosive chemicals that are just too insane to contemplate working with (and yet some labs still do):

Azidoazide Azides

[http://blogs.sciencemag.org/pipeline/archives/2013/01/09/things\\_i\\_wont\\_work\\_with\\_azidoazide\\_azides\\_more\\_or\\_less](http://blogs.sciencemag.org/pipeline/archives/2013/01/09/things_i_wont_work_with_azidoazide_azides_more_or_less)

Hexanitrohexaazaisowurtzitane

[http://blogs.sciencemag.org/pipeline/archives/2011/11/11/things\\_i\\_wont\\_work\\_with\\_hexanitrohexaazaisowurtzitane](http://blogs.sciencemag.org/pipeline/archives/2011/11/11/things_i_wont_work_with_hexanitrohexaazaisowurtzitane)

Dioxygen Difluoride

[http://blogs.sciencemag.org/pipeline/archives/2010/02/23/things\\_i\\_wont\\_work\\_with\\_dioxygen\\_difluoride](http://blogs.sciencemag.org/pipeline/archives/2010/02/23/things_i_wont_work_with_dioxygen_difluoride)

Peroxide Peroxides

[http://blogs.sciencemag.org/pipeline/archives/2014/10/10/things\\_i\\_wont\\_work\\_with\\_peroxide\\_peroxides](http://blogs.sciencemag.org/pipeline/archives/2014/10/10/things_i_wont_work_with_peroxide_peroxides)

etc.

[Torsionoid](#)

If there is a compelling reason to work with a material, we can find a way to do it. Production of explosives with very sensitive handling properties or high toxicity can be mixed, synthesized or tested remotely. -Bryce

Are there any substances you just will not work with?

Stuff that might reveal exciting science, but also scares you with instability and/ or explosive power?

This question is sort of a rip off of Derek Lowe's blog, a list of incredibly deadly poisons and ridiculously explosive chemicals that are just too insane to contemplate working with (and yet some labs still do):

Azidoazide Azides

[http://blogs.sciencemag.org/pipeline/archives/2013/01/09/things\\_i\\_wont\\_work\\_with\\_azidoazide\\_azides\\_more\\_or\\_less](http://blogs.sciencemag.org/pipeline/archives/2013/01/09/things_i_wont_work_with_azidoazide_azides_more_or_less)

Hexanitrohexaazaisowurtzitane

[http://blogs.sciencemag.org/pipeline/archives/2011/11/11/things\\_i\\_wont\\_work\\_with\\_hexanitrohexaazaisowurtzitane](http://blogs.sciencemag.org/pipeline/archives/2011/11/11/things_i_wont_work_with_hexanitrohexaazaisowurtzitane)

Dioxygen Difluoride

[http://blogs.sciencemag.org/pipeline/archives/2010/02/23/things\\_i\\_wont\\_work\\_with\\_dioxygen\\_difluoride](http://blogs.sciencemag.org/pipeline/archives/2010/02/23/things_i_wont_work_with_dioxygen_difluoride)

Peroxide Peroxides

[http://blogs.sciencemag.org/pipeline/archives/2014/10/10/things\\_i\\_wont\\_work\\_with\\_peroxide\\_peroxides](http://blogs.sciencemag.org/pipeline/archives/2014/10/10/things_i_wont_work_with_peroxide_peroxides)

etc.

[Torsionoid](#)

We have safety systems that allow us to work with many different types of hazards. Typically, quantities of extremely sensitive materials are kept to a minimum, so that the safety hazards are reduced as much as possible.

-David

Hey guys.

What's the biggest boom you've ever seen/created?

Also followup question: What would you have to do to get a literal "Earth-Shattering Kaboom"

[Kenori](#)

The largest "shot" that I've seen was on a tour of an open pit copper mine, when I was an undergraduate student taking explosives engineering. It was 60,000 lb of an ammonium nitrate based explosive. It certainly was earth-shattering, but not the loudest that I've heard, as it was timed to not fire all at once and it was deep underground. Being inside a bunker very close to an open-air, yet smaller shot is more impressive. -Bryce

Hey guys.

What's the biggest boom you've ever seen/created?

Also followup question: What would you have to do to get a literal "Earth-Shattering Kaboom"

[Kenori](#)

The largest "shot" that I have ever seen was during my first internship at Los Alamos when I was in undergrad. It was ~1000lb destruct shot. It was exceptionally loud and the shock wave was very impressive. That was the point where I decided I had to know more!

Hey guys.

What's the biggest boom you've ever seen/created?

Also followup question: What would you have to do to get a literal "Earth-Shattering Kaboom"

[Kenori](#)

I have attended a 600 lb Ammonium Nitrate car bomb shot, and the blast wave popped my eardrums. That was unforgettable. /Dana Dattelbaum

Hey folks-

Can you tell me about your DAQ solution? Are you faithful National Instruments users? What kinds of

tools are you currently using to visualize your real-time data?

[theonlystudever](#)

We use many different types of DAQ software and hardware for different experiments. I have hundreds of NI Labview VIs controlling hardware and analyzing data in real time, but MatLab, Mathematica, and other programming languages are all in common use. Labview is easiest for connecting to instruments. Common measurements include pressure, velocity of explosively driven interfaces (mostly optical interferometry), voltage, temperature, camera images, and much, much more.- Shawn

Is there a "holy grail" of explosives?

[ILurkyBumBumDown](#)

The explosives community and National Laboratories have always sought safer explosives that are higher "performing." By that, we refer to explosives that have high detonation velocities, detonation pressures, and temporal energy release matched to the application (weapons, mining, etc.). Novel concepts to provide higher performance is an active area of research. /Dana Dattelbaum

Did any of you ever run into any problems boarding a commercial flight because TSA ran a swab test on you and it came back positive for traces of explosives?

[unclear\\_plowerpants](#)

I've had positive responses for trace explosives in the airport, which just resulted in extra screening and questioning. -Bryce

What were some of the key stepping stones that lead to you becoming Explosives Scientists? Did any of you enjoy blowing stuff up as a kid?!

[Maccas75](#)

Most of us (including me) did not set out to become Explosives Scientists. Most of us just think of ourselves as scientists or engineers. We have varied degrees in science and engineering and apply our individual specialized knowledge to the application of explosives (safety, detection, chemistry, physics, whatever...) in different ways. I did use fireworks as a kid, but that wasn't something that set me on to this career. My degrees are in materials science and I'm most interested in crystallization and mechanical properties of crystalline solids. I did not even come to Los Alamos to work on explosives; I came to work on detection of biological substances and transitioned to the study of explosives a few years later. Dan

What were some of the key stepping stones that lead to you becoming Explosives Scientists? Did any of you enjoy blowing stuff up as a kid?!

[Maccas75](#)

I did not grow up wanting to be an explosives chemist. I did have the opportunity to participate in summer research at LANL as an undergraduate and this experience allowed me to gain an understanding of what energetic materials research was like. This experience was invaluable as was the opportunity to work with awesome mentors, such as Mike Hiskey. -David

What were some of the key stepping stones that lead to you becoming Explosives Scientists? Did any of you enjoy blowing stuff up as a kid?!

[Maccas75](#)

Building a strong foundation in the physical sciences (chemistry, physics, math) and being flexible to new fields will allow you to transition successfully from research topics earlier in your career to explosives or detonation physics research. /Dana Dattelbaum

What were some of the key stepping stones that lead to you becoming Explosives Scientists? Did any of you enjoy blowing stuff up as a kid?!

[Maccas75](#)

I would add that finding a good mentor is key. Most of us switched fields and worked closely with someone else for years. I actually never blew up anything as a kid! /Dana

Hi all, thanks for taking some time to do this AMA.

My question is, do you have any moral or ethical qualms about the nature of your work? I imagine that most of the end goal for explosives research is for military applications: portable explosives, bombs, other ordnance. Does any of that ever give you any pause?

Thanks!

[come\\_in\\_ski](#)

I don't think we are expanding the range of threats. Explosive dangers, conventional and nuclear, already exist. We primarily work to make explosives safer, detect illicit use, and counteract explosives in a safe manner. Shawn

Hi all, thanks for taking some time to do this AMA.

My question is, do you have any moral or ethical qualms about the nature of your work? I imagine that most of the end goal for explosives research is for military applications: portable explosives, bombs, other ordnance. Does any of that ever give you any pause?

Thanks!

[come\\_in\\_ski](#)

Actually, much of our explosives research is based on explosives detection and defeat, or finding ways to make explosives safer to handle. These are the projects that I am most proud of working on. - Virginia

Make me dream, what kind of experimental set-ups do you use to test explosives?

[cyril1991](#)

We use a variety of tools and set-ups, from single and two-stage gas guns to detonators and explosive trains (such as line wave generators, plane wave lenses and boosters) to design initiation and detonation propagation experiments researching different aspects of the science. For example, we use optical velocimetry (based on the Doppler effect) to measure velocities at interfaces of explosives with windows or air/vacuum, or embedded diagnostics to measure wave profiles. We also have a suite of radiography tools including x-ray radiography at DARHT, proton radiography at prad, and x-ray phase contrast imaging at National light (x-ray) sources. /Dana Dattelbaum

Make me dream, what kind of experimental set-ups do you use to test explosives?

[cyril1991](#)

Experimental set-ups can range in size and complexity. They can range from indoor small laser lab facilities, to chemistry labs, to indoor explosive firing chambers, to single and double stage gas guns, to outdoor firing facilities. Diagnostics can be simple (explosive detonation velocity) to much more complex. My experiments are small scale, ultra fast laser based performed in an indoor laser lab facility.

If someone wanted very precisely shaped explosives to simultaneously compress a perfect sphere of fissile material, how would one go about that?

[Ben\\_Thar](#)

Please apply to job ad above <http://www.lanl.gov/careers/index.php>. -Shawn

So what's fun and new in high explosives?

Also:

What are explosives crystals?

[ILurkyBumBumDown](#)

What's fun and new is that the science is incredibly challenging with very short time scales and extremely high temperatures and pressures. Even more than the experimental challenges, though, is that the safety and detection aspects have an immediate impact, and that is a large part of what we do. Most materials are crystalline. Lots of explosives are crystalline too. The study of crystalline solids is really important in understanding what you can do to the materials that would cause the chemical reaction that leads to various kinds of explosive responses. If you look at a sugar cube up close, you see that the sugar is crystalline and pressed together. If you look at many explosives up close, they look the same - they are crystals that are pressed or held together by some other means. In fact, pharmaceutical tablets are the same too! So this is materials science of organic compounds that transcends many useful applications. Here at LANL, we have the country's only large-scale explosives crystallization lab, where we can study the crystallization process to create powders or to grow large single crystals for materials science and shock wave physics study. We also study crystals for the other applications - pharmaceuticals included. Dan

So what's fun and new in high explosives?

Also:

What are explosives crystals?

[ILurkyBumBumDown](#)

Pushing the boundaries in diagnostics is exciting because we are obtaining insights into explosives behavior scientists only dreamed of 10 or 15 years ago. We are also researching new molecules, formulations and explosive designs, and having the freedom to be creative. /Dana Dattelbaum

Hi all, thanks for the AMA! I've got a question that's probably more aimed towards Becky, but I'd welcome any response.

As my flair indicates I work in radiation protection, and my line of work involves some emergency preparedness and response - this can range from incidents at plants to terrorist activities. For example, we were involved in the investigation of the assassination of Litvinenko (although this was a few years before I joined). One area that concerns us is the use of a dirty or radiological IEDs, and we do carry out some exercises and discussions as to how we would respond to this sort of incident.

I was just wondering, without potentially breaching any sensitive material, what considerations you

make towards this type of IED in your line of work when preparing security strategies, or trying to counter and minimise the risk of this threat?

[OldBoltonian](#)

LANL's global security mission focuses on detection and mitigation of CBRNE events. Unfortunately, I cannot provide more details regarding specific capabilities due to classification.

I know scientific experiments are really well planned and documented to prevent such occurrences happening, but has there ever been a moment where you guys thought 'Oh shit I'm dying in this lab today'? Thank you!

[Nuddadacadac](#)

To follow up with Dan's comment below, many explosives (and non-explosives) accidents occur when people become complacent, and no longer respect the material they are working with. Sometimes it is good to stop and remind yourself what you are working with, what would happen to you if it initiated, and what safety protocols you put in place to ensure that it doesn't happen.

-Virginia

I know scientific experiments are really well planned and documented to prevent such occurrences happening, but has there ever been a moment where you guys thought 'Oh shit I'm dying in this lab today'? Thank you!

[Nuddadacadac](#)

No. The work is highly controlled and most times I feel very safe. You can never, ever forget that you are working with explosives, however, and that, by definition, working on the frontier of knowledge, you have to remember that you don't know everything. I personally remind myself that if my "head is not in the game" I need to leave the lab and do something else. Dan

Is there still any plutonium or uranium work going on at Los Alamos? Or has it moved more into non-radioactive testing?

[Rowingteam](#)

While this is not really a topic for this AMA, I refer you to the NNSA website [nnsa.doe.gov](http://nnsa.doe.gov) and the Stockpile Stewardship Management Plan. /Dana Dattelbaum

What is your favorite memory from your career? And slightly off topic, do any of you ski the Los Alamos ski resort that was developed by the early scientists of LANL?

[707royalty](#)

Let's start with skiing. Many of us love skiing here - our local mountain is Pajarito mountain ([skipajarito.com](http://skipajarito.com)). In the lodge there are copies of the first documents from the founding of the ski area. The first petition was signed by none other than George Kistiakowsky, the Harvard chemist that led the explosives program in the Manhattan project. Dues were paid and meeting attended by many familiar names: Bethe, Weisskopf, Metropolis, Neddermeyer, Oppenheimer.... even Louis Slotin and Klaus Fuchs! My favorite memory was my first explosives experiment. Many months of preparation and work comes down to a nanoseconds to microseconds, and that can be intense: you have to get it right! Dan

What is your favorite memory from your career? And slightly off topic, do any of you ski the Los Alamos ski resort that was developed by the early scientists of LANL?

[707royalty](#)

Teaching military personnel about real-world threats is one the best things I've done here. And yes, our ski hill is great. 15 minutes from your house to the lift! We go there all the time. -Virginia

What is your favorite memory from your career? And slightly off topic, do any of you ski the Los Alamos ski resort that was developed by the early scientists of LANL?

[707royalty](#)

Getting asked an insightful and funny question in Russian, translated into English, at an international workshop. It was about carbonating nitromethane. /Dana

Hi, and thanks for the AMA, I hope this really blows up! I have just a couple fun questions for you:

What's the most interesting thing you've exploded?

What have you exploded that you would have previously never thought to explode?

[positive\\_electron42](#)

98% hydrogen peroxide. we had to build a remote loading apparatus to handle the material, and measured its shock sensitivity.

We have detonated a variety of liquid explosives, many of which are characterized as flammable solvents. Another example is diluted liquid explosives which have detonated with greater than 50% "inert" added to them. Unexpected!/Dana Dattelbaum

How much of your time is spent testing things outdoors, or is most of your work inside?

[thecruelstanimal](#)

It depends on the research and charge size. Many of our detonation propagation shots are performed in vessels or in indoor chambers. But above a few kg, we typically fire outdoors at LANL or at one of our collaborating or partner labs/sites. Some of our scientists fire shots outdoors every week, several times a week. I have mostly worked on gas guns and at indoor chambers on smaller shots, and only fire outdoors maybe 1x/year. /Dana Dattelbaum

Thanks for this AMA. I work with explosives as a military bomb technician (EOD) and I have a question that I've had trouble finding an answer too.

Is there a clear way to differentiate between Deflagration and Detonation? The most consistent answer I've seen is a Deflagration happens when the rate of combustion happens slower than the speed of sound in the medium and Detonation happens when the rate is faster than the speed of sound in the medium. I've also seen contradictory reports on this.

Is this the correct way to differentiate between to two and is there a source I can reference when this topic comes up?

Thanks in advance.

[I\\_can\\_haz\\_eod](#)

Yes this is the textbook definition of the difference between detonation and deflagration. There are good books by Cooper (Explosives Engineering) and Zukas and Walters (Explosive Effects and Applications) that you could read to get more information. -Virginia

Hi all, I recently visited the area and was impressed how isolated the campus is from civilization. 1) How's the accommodation? 2) On average, how long do you last living there before you go crazy and tired of the mountain life? 3) On July 4th, I bet you get to play with some nuclear fireworks, don't you? 4) Do you have a YouTube channel where we can see some tax dollar fireworks go off? Thanks!

[Olivejardin](#)

I absolutely love living here - and it obviously appeals to most of us that live here. I travel to cities and enjoy it, but - as a counterpoint to the way you posed your question - "go crazy" in a couple of days of city crowds and want to get back to the mountains. There is nearly unlimited opportunity for outdoor recreation and a great climate in all seasons. Yes, Los Alamos has a YouTube channel where you can see lots of explosives experiments and many other topics. For example, we have many important accomplishments in bioscience, energy.... we even play an important role in one of the sensor platforms on the Mars rover. Dan

Hi all, I recently visited the area and was impressed how isolated the campus is from civilization. 1) How's the accommodation? 2) On average, how long do you last living there before you go crazy and tired of the mountain life? 3) On July 4th, I bet you get to play with some nuclear fireworks, don't you? 4) Do you have a YouTube channel where we can see some tax dollar fireworks go off? Thanks!

[Olivejardin](#)

Hi! Los Alamos is a great place to live and we enjoy the outdoors (hiking, skiing, biking)! For 4th of July, many of us are engaged with preparation and execution of the local fireworks show in White Rock. -  
Becky

Hi all, I recently visited the area and was impressed how isolated the campus is from civilization. 1) How's the accommodation? 2) On average, how long do you last living there before you go crazy and tired of the mountain life? 3) On July 4th, I bet you get to play with some nuclear fireworks, don't you? 4) Do you have a YouTube channel where we can see some tax dollar fireworks go off? Thanks!

[Olivejardin](#)

Haha! good ones. Yes it is isolated, but many of us like the outdoors and NM climate and scenery can't be beat. Housing is more expensive than one might expect given our isolated location. Several of our explosive chemists have created fireworks for the entertainment industry. Just different chemicals and burn rates! /Dana

What was your favorite thing you have ever done while on the job?

[Noerdy](#)

My favorite part of our job is learning something new about explosives that has never been known before. It is exciting to apply cutting edge experimental tools to make in situ time-resolved measurements on complex explosives assemblies. Our teams at the Laboratories are well-trained, creative and have diverse backgrounds to bring to a single problem. On a more personal note, I love the excitement associated with making a really difficult measurement! /Dana Dattelbaum

What was your favorite thing you have ever done while on the job?

[Noerdy](#)

For me, it was resolving the reasons for highly varied results of elasticity in molecular organic crystals - something I spent more than 10 years studying. It turns out to be less interesting than I had hoped, but a good lesson in basic science: be very careful with your samples, your measurements, and especially your evaluation of experimental and data reduction error. We wrote a long review on this topic last year

in the journal Propellants, Explosives, Pyrotechnics. That's a journal with obvious specialization in our field, and in fact we mostly studied explosives, but I think the lesson is much more broadly applied to the whole class of materials. I love the fact that the environment at Los Alamos allowed us to dig in and solve this issue. I also loved the historical element of elasticity from Robert Hooke (and the story of his feud with Newton) that we could bring to the article.

What was your favorite thing you have ever done while on the job?

[Noerdy](#)

I am part of a larger team that has been teaching military personnel against real world threats and detection mitigation of those threats. This is extremely and immediately rewarding work!

What was your favorite thing you have ever done while on the job?

[Noerdy](#)

My favorite aspect of my job is the discovery science aspect. I really enjoy synthesizing and characterizing materials that have never been made before.

-David

I'm a combat engineer in the U.S. Army Reserves - I've blown some stuff up in my day. A big blast, for example, a road crater or reducing a concrete bridge pier, requires a lot of HE, which means somebody has to carry that in their ruck, or you need vehicles to transport it. What future materials might we see that are lighter, allowing the same explosive energy for half the mass/volume of current materials?

[SapperInTexas](#)

Hi! We work very closely with the Dept. of Defense on next generation munitions/weapons. - Becky

Many of the explosives Los Alamos has helped to develop, including plastic explosives and more notoriously nuclear explosives, have long been controversial and have been used against civilian populations at great loss of life. How does the national lab handle the ethical issues involved in weapons development and production, and how personally do the scientists involved in the project feel about their work? Does the laboratory have any discretion in what technologies it chooses to develop, and has the laboratory moved more towards non-military applications of this technology like rocketry and EOD tech?

I also feel like I should ask about exploding crystals.

Thanks!

[WakingMusic](#)

The core mission of Los Alamos is the stewardship of the US Nuclear stockpile. As such we research all relevant aspects of explosives safety, performance, and stability. However, we perform many other types of research in all areas of science, and apply this expertise as needed in many ways, including in explosives R&D. This ranges from detection and defeat to safety. In the new issue of National Security Science with link provided at the top, you can read about our efforts in many areas, including safer rocket propellants and training EOD technicians. We have also developed many inferential technologies, such as nano structured metal foams generated by burning of propellants, and perform research on similar materials such as pharmaceutical materials. This link between explosives and pharmaceuticals is one of the reasons we study crystals - see some of the other answers on this topic.  
Dan

Many of the explosives Los Alamos has helped to develop, including plastic explosives and more notoriously nuclear explosives, have long been controversial and have been used against civilian populations at great loss of life. How does the national lab handle the ethical issues involved in weapons development and production, and how personally do the scientists involved in the project feel about their work? Does the laboratory have any discretion in what technologies it chooses to develop, and has the laboratory moved more towards non-military applications of this technology like rocketry and EOD tech?

I also feel like I should ask about exploding crystals.

Thanks!

[WakingMusic](#)

Actually, we do devote a good amount of time to training EOD techs (see the article in the NSS magazine referenced at the top). The most rewarding projects I have been involved with are focused on making people safer from explosives that are being used by terrorists or extremists. -Virginia

How do you feel working in the most beautiful area of the country? Not to mention it is also the most beautiful area in New Mexico. There must not be a greater job to have.

[alexmeowshall](#)

Los Alamos is an amazingly beautiful area and we are very lucky to have the lab located here (Thanks Oppenheimer !). We have an abundance of outdoor activities (from hiking, to climbing, to skiing, to biking, fishing... the list goes on and on). I work in a pretty secluded area and have the opportunity to see wildlife ( elk, deer, bobcats, coyotes and sometimes bear.. to name a few) on the drive into work as well as from my office. This I believe is very unique and look forward to going to work every day. Margo

How do you feel working in the most beautiful area of the country? Not to mention it is also the most beautiful area in New Mexico. There must not be a greater job to have.

[alexmeowshall](#)

It is certainly a beautiful area, and that was in fact one of the reasons that Oppenheimer selected Los Alamos as the site. It is a significant benefit to the job and great for people that love outdoor activities! - Bryce

How do you feel working in the most beautiful area of the country? Not to mention it is also the most beautiful area in New Mexico. There must not be a greater job to have.

[alexmeowshall](#)

I grew up in Northern New Mexico, and having the Laboratory here allowed me to stay in the area and still work in science.

-David

How did you become interested in this field? And beside basic chem, phy, and thermo, what else did you study in college to prepare you for a career in high energy explosive research?

Thanks.

[vixitknight](#)

I was interested in the time-resolved measurements which were similar to the photo physics experiments I did in graduate school. Also being able to perform explosives research is pretty rare and

it is a small community.

For classes - math, physics, optics, and technical writing. /Dana Dattelbaum

How did you become interested in this field? And beside basic chem, phy, and thermo, what else did you study in college to prepare you for a career in high energy explosive research?

Thanks.

[vixitknight](#)

For me, the link was the study of crystallization and materials science of complicated solids. My degrees were in materials science, and my background was a bit more traditional - metal casting, finishing, and corrosion. Everyone here has a different path for how they got here. Dan

How did you become interested in this field? And beside basic chem, phy, and thermo, what else did you study in college to prepare you for a career in high energy explosive research?

Thanks.

[vixitknight](#)

There are several universities that have explosives science or engineering programs, but most of us came in from other work in chemistry or physics and learned high explosives science here at Los Alamos. -Shawn

Hi, single dad here - How can I get my daughter (13) more interested in science / chemistry / physics? What was it that interested you (ladies) to get involved with science(s)?

[Big\\_pekka](#)

Expose her to science through lab or industry tours, university programs or other middle/high school programs, and great role models. As she gets older, encourage her to get involved in class or individual science research projects. It is usually the small interactions or experiences that make a difference. I personally loved the problem solving aspects of science, and learning something new by research that could benefit our world (such as solar/energy research, new materials research, etc.). /Dana Dattelbaum

Hi, single dad here - How can I get my daughter (13) more interested in science / chemistry / physics? What was it that interested you (ladies) to get involved with science(s)?

[Big\\_pekka](#)

I agree with Dana. For myself, it was always more meaningful when I had more of a "hands on experience". In grad school our physics department had a traveling science experiment circus called "little shop of physics". Individuals of all ages really enjoyed the smaller scale physics based interactive experiments that were a part of this program. Margo

It seems that most advances in explosives are geared toward making them as powerful as possible. Are there any advances in explosive technology that make them more controllable and slower, or that create less damage?

[fireking99](#)

Yes. Military explosives used in nuclear weapons typically have short duration impulses, high detonation pressures and velocities, and short reaction zones. However, mining explosives or

thermobaric explosives have longer "pushes" behind the detonation front for pushing metal over longer time durations. /Dana Dattelbaum

What is your favourite explosive?

[mokid91](#)

My favorite explosive is always the next one that I am about to make!

-David

What is your favourite explosive?

[mokid91](#)

Nitromethane of course./Dana Dattelbaum

What is your favourite explosive?

[mokid91](#)

I second nitromethane, because it is a simple molecular structure, an optically transparent liquid that facilitates our spectroscopic measurements, homogeneous, and undergoes superdetonation. Shawn

Many graduate students struggle with deciding whether or not to move into the national labs or stay in academia. As a lab scientist would you recommend LANL, or other labs, for a possible post-doc positions or stick in academia?

[updootsforyou](#)

I came to the lab with the intent to do a Post-doc and then move to academia, and have considered a move to academia at least once more during my career. I made the choice to stay. The lab is a good middle ground with many of the positive elements of both, in my opinion. There is a strong academic open-research environment with world-class expertise and tools in almost every branch of science and engineering. There is a very large student and post-doc program, with opportunities for collaboration with academia. Meanwhile, there is a great intellectual property environment and strong ties to industry as well. From a post-doc, with any uncertainty, I think you could step to either direction from a National Lab. Dan

Many graduate students struggle with deciding whether or not to move into the national labs or stay in academia. As a lab scientist would you recommend LANL, or other labs, for a possible post-doc positions or stick in academia?

[updootsforyou](#)

I would recommend a postdoc at a national lab over academia. My initial plan was to postdoc here, then move back to academia, but I stayed because of the great research environment. The benefit of a national lab is that there is typically a group of related experts working on any given topic. You can always find someone that can help you make progress. Also, work in explosives or other global security fields can have a positive societal impact, whereas university research may be more academic. Shawn

Many graduate students struggle with deciding whether or not to move into the national labs or stay in academia. As a lab scientist would you recommend LANL, or other labs, for a possible post-doc

positions or stick in academia?

[updootsforyou](#)

I greatly enjoyed my time as a post doc here at the Laboratory. One of the most positive aspects is the multidisciplinary nature of the opportunities. It is challenging to get this type of experience in academia.

-David

Many graduate students struggle with deciding whether or not to move into the national labs or stay in academia. As a lab scientist would you recommend LANL, or other labs, for a possible post-doc positions or stick in academia?

[updootsforyou](#)

One can always do both! There is a large amount of people that will transfer between the national labs and academia, or take a split position at both. -Bryce

What is the most counter-intuitive phenomenon in the science of explosives in your opinion?

And also, what common misconceptions about explosives annoy you?

Thanks!

[hztheo](#)

Most cinematic representations of explosions are inaccurate with respect to timing. Real detonations do not lend themselves well to filming using standard filming techniques. Often times people are portrayed as being capable of outrunning a detonation, which is not accurate.

Dutch Applied Physics PhD here. I was wondering, is it really not possible to work at a National Lab if you're not a US citizen? I see so many jobs that would fit perfectly, but they all require US citizenship.

If it is required, have you had anyone apply for citizenship to qualify?

[DennistheDutchie](#)

Yes, all of the National labs have strong student and post-doctoral programs that hire foreign nationals. The labs also have diverse science missions. Please check out the labs' websites for open job ads. Citizenship is not required for many fields/positions. /dana dattelbaum

Dutch Applied Physics PhD here. I was wondering, is it really not possible to work at a National Lab if you're not a US citizen? I see so many jobs that would fit perfectly, but they all require US citizenship.

If it is required, have you had anyone apply for citizenship to qualify?

[DennistheDutchie](#)

It is possible to work at the Laboratory as a foreign national. It is very challenging to work in energetics if you are not a US citizen though.

-David

Is there any reason why a shaped charge could not be formed by pouring liquid explosive into a mold, or is this already common?

[Thameus](#)

Use of liquid shaped charges works, and has been done. Several literature reports, usually using nitromethane as the liquid explosive can be found with a quick Google search, such as <http://www.tandfonline.com/doi/pdf/10.1080/07370650802640317> and <http://www.tandfonline.com/doi/pdf/10.1080/07370650802640317>. - Shawn

Is there any reason why a shaped charge could not be formed by pouring liquid explosive into a mold, or is this already common?

[Thameus](#)

Liquid explosive shaped charges have been used. /Dana Dattelbaum

Many people associate explosives with weapons. While a lot of the work at LANL is weapons related, what are your favorite examples of explosives being used for non-weapons related applications? i.e. pyrotechnics, propellants, tools for scientific understanding

[unicyclingwithPETN](#)

The vast majority of explosives are used by the mining industry, millions of pounds per year. Other interesting examples included the use of explosives to stimulate oil wells to be more productive, the use of explosives for welding, bolt cutting, pilot ejections mechanisms, etc.

-David

Have any of you ever done a "Career Day" sort of thing at an Elementary School where you explain to kids what you do for a living?

I am sure if someone like you ever came to my school and informed me that this type of job existed, I would have taken my studies more seriously.

[silentjay01](#)

I try to do outreach to local schools to provide some information on science careers. When I was in high school I had the opportunity to apply for a summer job at the Laboratory and this really helped me to get started on a serious science track, rather than my pie-in-the sky approach, due to my lack of access as a teenager.

-David

How hard is it to get a job working with explosives at los alamos?

One of my relatives works there or near there and he's literally a genius he got one of his college degrees while in high school.

what're your favorite explosive related quotes?

[Jpf123](#)

"No smoking unless you're on fire." /Dana

What is the coolest looking explosion?

[Rhinosaucerous](#)

We often do simple tests of explosives in copper tubes to determine what their performance is. We have diagnostics to measure detonation velocity and wall expansion. When we can get our hands on a fast camera (1 frame per microsecond), the expansion of the copper at that timescale is beautiful and

frightening. (frightening because you can see the copper metal breaking apart like tissue paper) -  
Virginia

What is the coolest looking explosion?

[Rhinosaucerous](#)

Those that throw metal fragments that burn in air are impressive. /Dana

Do you use light gas guns in your research?

[starbuckroad](#)

Yes, we use a suite of light gas guns at the National and defense Laboratories. At LANL, we have ~10 light gas guns with different velocity ranges and purposes. Several of these guns are dedicated to detonation physics (explosives) research. They have large launch tube bore diameters so that the temporal duration that we can study the shock initiation process is as long as possible. These guns are similar to those at several other research and defense laboratories in the U.S. and abroad. /Dana Dattelbaum

How does one get into this field? I'm studying chemical engineering currently and would like to get into it. How would you recommend trying to get into the explosives field?

[IKillerBee](#)

Hi. My undergraduate degree is in Chemical Engineering. My personal path to the explosives field started with a year long student position at Los Alamos National Lab where I did indoor and outdoor smaller scale explosives research. They have an amazing student internship program here (undergraduate and graduate) which affords an individual the opportunity to "check out" the field. Check out the following site if you are interested <http://www.lanl.gov/careers/career-options/student-internships/> After my year as a post-baccalaureate student, I was hooked and went back for my advanced degree in physical chemistry where I worked on gas phase photo-dynamics of energetic materials.

How does one get into this field? I'm studying chemical engineering currently and would like to get into it. How would you recommend trying to get into the explosives field?

[IKillerBee](#)

There are several ways to get into a field you are interested in. Chemical engineering is a good way to get a solid background in the sciences that you could later apply towards explosives research. I started at Los Alamos National Lab in solar energy research, but then moved over to explosives after I had been here a while and made some connections. -Virginia

Do you ever get rid of explosives you no longer need by just blowing them up?

[moaningpilot](#)

As a matter of fact, we do. In many cases this is the safest method of disposing them. That said, this is a tightly regulated process and requires necessary permits to be in place prior to such activities.

What's the most unusual use of explosives you've ever seen?

[tagged2high](#)

Explosives art. You can put a leaf (or any material) on a metal plate, place sheet explosives on top of it and detonate it, and the leaf is imprinted in the metal. -Virginia

What's the most unusual use of explosives you've ever seen?

[tagged2high](#)

Explosive Art. Check out some of the responses to that topic on this AMA.

Oh my I came into an AMA in its inception, how fortunate!

Here's my question, what is one of the biggest problems we face with using explosives in outer space? What would happen if someone were to detonate a block of C4 in space or something, would it work? If not how could we make feasible explosions in space?

This very much interests me as I am running a Tabletop RPG game in a science fiction setting and I want to inject some realism! Thanks!

[TheStario](#)

Detonating explosives in space will certainly work, much the same as burning rocket propellants for spacecraft propulsion works. One of the primary differences that one would observe, if you happen to be on a spacewalk with your hypothetical C4 charge, is that without air, you would have no air blast. As I'm sure you've heard people say, sound does not travel in a vacuum. However, you would observe the flash of light from the detonation and see the expanding gaseous products. NASA has actually used explosives for seismic mapping on the moon. -Bryce

[deleted]

[\[deleted\]](#)

Energetic polymers research is one of the most challenging areas of research. Energetic polymers would be useful in many different applications, not just propellants. -David

This is weird...I just applied to my university's college of Explosives Engineering about 15 minutes ago. I have spoken to Los Alamos recruiters at our career fair and they said that Sandia Labs play with the big toys while Los Alamos merely does research in the math surrounding an explosive event. How much of this is true?

[Assdolf\\_Shitler](#)

The Laboratory does a lot of hands on experimental research on energetic materials, from synthesis, to characterization and performance testing.

-David

Hi, I'm a student at New Mexico Tech and was wondering how much you guys work with EMRTC here, if at all, for the research and explosives you guys do?

[Slayer128](#)

We collaborate with EMRTC and conduct joint research projects which provides us an opportunity to work with their student explosive engineers. New Mexico Tech is one of the few schools that offers degrees in explosives engineering.

Can you discuss anything about different types of aerogels and their uses in explosives?

[banjaxe](#)

My graduate studies included production of aerogel-like explosives, produced from a sol-gel process and freeze-drying. The resulting low-density structure is called a "cryo-gel". More classic aerogels have been used as very low-density targets in shock physics experiments. -Bryce

With the exception of Dr. Olinger, it seems none of the people doing this AMA have come from UNM (very quick search though, so I may have overlooked something). As a student there, I must admit that a huge concern for me is prestige of the university and its effect on my future (and given that I chose UNM over UCSB, I often wonder if I made the right choice).

How important is prestige of one's alma mater, really? And do you view UNM and its alumni differently than, say, a more prestigious state university? (Side note: isn't it funny that NM has some of the most prestigious STEM facilities in the nation but the higher education is totally lacking a similar sort of recognition--and, possibly, quality?)

Also; I recently attended a conference that gave a lengthy talk encouraging physicists to ditch academia for industry--had any of you initially wanted to go into academia? What caused you to make the switch to industry?

[CeleritasHorse](#)

-The most important aspect, from my perspective, is to do the best you can do, what ever school you are at. This will show through when you apply for jobs or graduate schools.

How do you expect quantum computers and increases in computing power in general to impact your work going forward?

[SteveDaPirate](#)

No one has built a true quantum computer yet, but if they greatly advance computational speed, they could enable quantum molecular dynamics (QMD) simulations of explosives. QMD treats explosives and shock waves at the molecular level, ideally predicting reactions and rates of current and potential new explosives. Current computers, even supercomputers are not big enough to treat problems from the molecular scale all the way up to hydrodynamics. Quantum computing may help bridge this gap.-  
Shawn

What advice do you have for a chemistry PhD student who would be interested in working at the LANL Explosives Center? What type of background is required?

[Paradigmist](#)

Check out our career opportunities at: <http://www.lanl.gov/careers/index.php>

We currently have many opportunities available.

I have a bachelor's degree in chemistry and I'm utterly fascinated by explosives. I honestly have no idea what kind of master's degree to pursue in order to specialise in that particular field. Would you guys know which universities offer such programs and how many types of specialisations actually exist ? We don't have a dedicated master's degree related to the field in my native country (or any other kind of explosive-centric degree for that matter) Your advice is greatly appreciated !

[Slutmonger](#)

If you are interested in synthesis, stick with chemistry and find a graduate or post-doc opportunity within

the National or DoD labs. If you are more broadly interested in explosives, there are explosives engineering programs at NM Tech and several other universities, and courses taught at places like Univ. of MD, Caltech, Perdue, Ga Tech, University of Missouri, Washington State University and others. Physics, mechanical or aerospace engineering, physical chemistry and geophysics all have overlapping themes with our field. Most of us have a different degree background and moved into this field after graduate school./Dana Dattelbaum

I have a bachelor's degree in chemistry and I'm utterly fascinated by explosives. I honestly have no idea what kind of master's degree to pursue in order to specialise in that particular field. Would you guys know which universities offer such programs and how many types of specialisations actually exist? We don't have a dedicated master's degree related to the field in my native country (or any other kind of explosive-centric degree for that matter) Your advice is greatly appreciated!

[Slutmonger](#)

There are a few universities in the US that have masters and PhD programs in explosives, but many of us came to Los Alamos with advanced degrees in chemistry and physics, and moved to the explosives division later on. As long as you get a degree in the hard sciences, you have the option to move from one field to another with a little persistence. -Virginia

Do you work on Energetic Materials that react thru photonics instead of thermal ignition?

[Ivebeenstimulated](#)

It depends on how deeply you look into what is the mechanism of ignition. We often use lasers to ignite explosives, and in fact just published a paper (with Purdue University as the lead authors) on flash ignition of high-nitrogen energetic materials. However, as the material absorbs light, it will in one way or another transform the optical energy into thermal energy. If you're interested in the publication it can be found in the just accepted section of the journal Combustion & Flame. -Bryce

Do you work on Energetic Materials that react thru photonics instead of thermal ignition?

[Ivebeenstimulated](#)

There have been many studies using nanosecond pulsed lasers to drive shock waves into explosives (and nonexplosives). This allows a fiber optic to connect to explosives instead of a wire, mitigating accidental explosion from lightning or other accidental electrical discharges. Shawn

Do you work on Energetic Materials that react thru photonics instead of thermal ignition?

[Ivebeenstimulated](#)

Light-driven initiation of explosives is a topic of active research at several different labs. See for example works of Greenfield et al., Gois and Platkin./Dana Dattelbaum

Do you work on Energetic Materials that react thru photonics instead of thermal ignition?

[Ivebeenstimulated](#)

Yes, we have studied this area.

-David

I've heard of "sub-crits," or underground donations of nuclear material (uranium?) below the quantity

needed to create a nuclear explosion. This is supposedly done as a test to gather data. Are sub-crits a thing? If so, what kind of data is gathered?

[teachrdan](#)

Subcritical experiments are underground detonations that use high explosives to drive special nuclear material yet remain subcritical. The experiments are used to understand implosion dynamics or other weapons physics phenomena. The U1a facility at the National Nevada Security Site is used for these experiments. More details can be found at [nnsa.doe.gov](http://nnsa.doe.gov) and in the National Stockpile Stewardship Management Plan which can be found on that website. /Dana Dattelbaum

Are there any explosives that produce interesting or unique effects or are there any explosives that were deemed undesirable, but later found a popular use?

[Moxtronic](#)

Many explosives have very interesting or unique effects, and by the vast amount of explosives in use you can find different attributes that make them desirable for one reason or another. For example, early on, ammonium nitrate explosives were not given much attention but later on became the most used mining explosives. Dynamite was also dismissed by the elder Dupont and it was only the persistence of one of the children to develop it as part of the business over black powder. -Bryce

What does the job market look like for EOD techs? The army is downsizing and I'm trying to determine if there's a future for me in the civilian sector using my current skill set.

[tylerdanger](#)

Take a look at the Los Alamos National Lab website under careers (<http://www.lanl.gov/careers/career-options/>). I don't know much about the market for EOD techs, but we have hired a few in the recent past and there's definitely opportunities. Having an energetic materials background is very helpful. - Virginia

Which career path would a young person (16), who is interested in the chemistry of explosives have to take to be able to work in the synthesis, development and testing of new explosive substances? Do you know anything about similar facilities in Europe where one might be able to pursue these interests?

[Nukeer9578](#)

Thomas Klapoetke has a research group in Munich Germany. He is a professor who has numerous students that work for him for Masters and PhD degrees.

How effective is using explosives to put out a (forest) fire?

Also, what is the "safest" explosive? Always heard about new explosives goes boom on touch or moved by 1 planck's constant .

Thanks for being banging awesome!

[nguyenm](#)

There have been some thoughts on using energetic materials known as gas generators to try to put out forest fires. Interestingly, some gas generators can be incorporated into paints and have been shown to decompose and generate inert gas when exposed to flames. This application could be used to put out fires in buildings or around spark producing activities. -David

Is there any research being done into the use of (presumably modified) biological agents to synthesize explosives?

[stimpysdad](#)

There has been research performed in this area in the past. The studies were funded by SERDP out of the DoD. The goal was to develop methods to where bacteria could synthesize key energetic materials precursor compounds. I would suggest looking at the book "Green Energetic Materials", edited by Tore Brinck, to learn more.

Have you done any research on Hexanitrohexaazaisowurtzitane. I ask because I came across an intermediate product of the synthesis of it at a chemical plant on Friday. I believe it was Hexabenzylhexaazaisowurtzitane. I work in waste disposal and we weren't sure what to classify it as to ship it out.

[Manler](#)

I am familiar with the hexanitrohexaazaisowurtzitane. The other compound is not an explosive, only an intermediate and is organic waste.

Do you have any moral qualms about the work you do? Do you ever think about how your work might be misused or lead to enormous loss of life. If so, how do you deal with that?

[magicsonar](#)

This is a great question - I answered it several times above somewhere (talking about what we do with EOD technicians and explosives detection). -Virginia

Whilst many people know about shaped charges and what they can do with armour, what other neat things can be done with the precision use of shaped explosives outside the military?

[hughk](#)

Shaped charges are also used extensively as perforators in oil wells. Shawn

How does one become an explosives scientist? I am an aero engineering student with a strong interest in rocketry and energetics of all types, what type of education do you need to do research and Los Alamos?

[wiltedtree](#)

Los Alamos has quite a broad base of research. For explosive science, background education can be from explosive engineering, chemistry, chemical engineering, physical chemistry, physics... the list is quite diverse and not covered in completion here. Los Alamos is known for their great student internships. Personally, this is where I started to learn about explosive science.

What kind of work is being done to test the fate of these explosive compounds, and their daughter compounds in the environment?

[Chakra4](#)

We are sensitive to the environmental effects of all aspects of what we do, from making new materials to their destruction. In fact we have gotten recognition for the environmentally friendly synthesis of our material DAAF (diaminoazoxyfurazan), which also won an R&D 100 award. We are also very cognizant of the appropriate disposal of the materials, and their safe and environmentally sound method of disposal by burning and detonation, for which the products are a mixture of gases native to

the atmosphere. Dan

What kind of work is being done to test the fate of these explosive compounds, and their daughter compounds in the environment?

[Chakra4](#)

Any materials under consideration for actual use are run through a series of test to help address these concerns.

How could I get classes from you as active military? I have been in 15 years and never thought about the research that goes into the explosives I carry and use.

Ps, incendiary grenades and JP8 didn't have the effect I had hopped for, and C4 was not as good at cutting down trees either

[PRiles](#)

You can request courses at Los Alamos through your training coordinator or you can email us at [LACED@lanl.gov](mailto:LACED@lanl.gov) and we can put you in touch with the appropriate POC's. - Becky

Are there any non destructive uses for the explosives that are developed at Los Alamos that do not specifically target destruction reduction?

[Kiraka](#)

We have developed materials, known as gas generators, that can be used in vehicle air bags and in safety inflation devices, such as life vests and rafts.

We have also done research that led to smoke free pyrotechnics. This technology is now used in Super Bowl shows, the Olympics, wrestling events, etc.

-David

Hi David and all, thanks for doing an AMA. Super interesting research.

My question is how well are we able to characterize the detonation and evolution of these materials? And what is the paramount challenge in the numerical modeling of high explosive materials?

[AeroMechanik](#)

We are able to make high accuracy measurements of detonation performance - velocities, pressures/particle velocities, and energy release (to ~1% in some cases).

A couple of major challenges include: 1. Understanding many of physical and chemical processes with detail and capturing those in a meaningful way in a model. Examples include reaction chemistry... we don't know what the reactions are, so we often use global kinetic representations to simulate them. 2. Scale. The processes in detonation occur over scales from atomic/molecular (for chemistry) to localization phenomena at the micron scale in explosive composite structures to propagation over cm. These processes are difficult to represent in models with enough physics or chemistry that are applicable over ranges in scale and application. There are also code/mesh size and computational expense limitations making it infeasible to perform large scale simulations of the details at smaller length scales.

/Dana Dattelbaum

Hi David and all, thanks for doing an AMA. Super interesting research.

My question is how well are we able to characterize the detonation and evolution of these materials?  
And what is the paramount challenge in the numerical modeling of high explosive materials?

[AeroMechanik](#)

There are very accurate and effective methods to characterize explosive performance, such as detonation velocity and detonation pressures, blast pressures, etc. There are numerous challenges regarding modeling the sensitivity of explosives toward destructive stimuli.

octanitrocubane. have you ever played with it?

[xSialicAcidx](#)

Octanitrocubane is very challenging to make, and requires several steps, so there is little incentive to make it.

octanitrocubane. have you ever played with it?

[xSialicAcidx](#)

It only exists in theory. :) /Dana

Thanks for the AMA! Do you guys have any video of test explosions anywhere? Also, back in my EOD days, I loved the kick in the chest you felt from demolitions, any good stories about the best kick you ever got?

[Nuadarebirth](#)

Video link <https://www.youtube.com/watch?v=FMZ6sGic6sl> also links to many other Los Alamos science videos. Shawn

Dr. Hooks, I've heard that similar crystal structures can be used in medicinal usages and boom-boom usages. Is that true? And who are the scientists that are at the cutting edge of this research?

[I am very attractive](#)

The vast majority of organic materials crystallize in monoclinic crystal structures, although all of the crystal classes are represented. I work routinely with tetragonal, orthorhombic, monoclinic, and triclinic crystals. There is a large community of solid state organic chemists and materials scientists across many areas of applications - see, for example, the Cambridge structural database or the journal Crystal Growth and Design for references and authors in the field. To give an example of a cross-cutting crystal class, the explosive HMX, common sugar, and the pharmaceutical acetaminophen are all monoclinic solids. We study all of them. Dan

Hello all, and thank you for the AMA!!

My question relates mostly to Shawn's work. I work with lasers for photovoltaics applications, and was wondering what kind of laser applications/projects are there in the realm of explosives? Other than say, guidance systems and spectroscopy.

[WhiteEyeHannya](#)

Lasers are very frequently used in interferometric measurements of the velocity of explosively driven experiments, such as expansion of cylindrical pipes or the shock wave moving from one material to

another. We also use lasers to measure chemistry (absorption and emission spectroscopy), temperature (Stokes/anti-Stokes Raman spectroscopy), and to set off explosives. - Shawn

Hello, and welcome! I imagine you use various test objects to gauge the effects of the researched explosive. What was the most satisfying thing you've ever... let's say disintegrated?

[skomm-b](#)

Well, explosives don't technically disintegrate anything (law of conservation of matter) - see [TheExplodingWhale.com](#) for an example of this. We use many test objects to gauge the effects of explosives depending on the nature of the experiments. My personal favorite at Los Alamos was a building to determine if the design parameters were valid.

In just a fun-type setting, which explosive has the best reaction?

[BlueBlackCat](#)

There are some explosives that in small amounts (10-20mg) will burn quickly with a flash if you put them in an aluminum pan and apply a flame to them. But if you put a piece of tape over that same explosive to confine it, it will detonate and rip apart the pan when you apply the flame. Just a small amount of confinement can make a big difference in safety. -Virginia

In just a fun-type setting, which explosive has the best reaction?

[BlueBlackCat](#)

I guess that depends on your perspective...

Simple reactions like ozone or hydrogen peroxide, which release a lot of energy

Complex and not well understood phenomena like sensitizing of explosives or what reactions may contribute to energy release within the chemical reaction zone by chemical mixing at short times. /Dana

Hello guys! I am a University Physics student. Could you talk about any good resources for learning about shockwave physics and hydrodynamics simulation?

[GotBerned](#)

Please check out some of these books: The Springer series on shockwave compression and explosives (edited by Yuki Horie) Shock wave compression of condensed matter - Jerry Forbes Detonation by Fickett and Davis Zeldovich and Raizer

What kind of degree of formal education do any you have?

[HaroldM10](#)

BS, MS or PhD in Chemistry, Chemical Engineering, Physics are the most common. We also have Mechanical Engineers in our groups as well. Additionally, we work with computational modelers and theorist frequently. -David

Thanks for the AMA! Are you guys Mythbusters fans, and did you ever see an explosion on the show where you thought they should have done it differently, used a different technique, or explosive?

[cslfish](#)

Mythbusters is a fun show. I particularly liked their C4 episode, and the way they explained some of the properties of that explosive. Sometimes they don't do all the experiments that they could do fully answer a question, but there's only so much you can do in a short show. -Virginia

You are all career scientists, right? How do you balance the need to publish with the national security issues?

[HelenKellersJPEGS](#)

I try to publish all the basic research aspects of my work. So far, this approach has allowed me to publish at a reasonable rate.

-David

How do you feel today about the rise of Livermore? Is there still bad blood/competition?

[Something\\_Political](#)

As individual researchers, we all have very close and productive interactions between Los Alamos and Livermore, and many friendships between the labs. -Bryce

It might be a stereotype, but usually boys like explosives, while girls like it less. Or maybe so I thought. But your list has half male names and half female ones. Is that a typical gender distribution in explosive physics/chemistry at Los Alamos?

[hkubota](#)

As a woman in this field I am always pleased at how many female scientist I see here at Los Alamos as well as at external conferences. In the areas that I work (explosive chemistry and explosive shock physics) the distribution is typically 1/3 to 1/2 women. Margo

It might be a stereotype, but usually boys like explosives, while girls like it less. Or maybe so I thought. But your list has half male names and half female ones. Is that a typical gender distribution in explosive physics/chemistry at Los Alamos?

[hkubota](#)

The field still has a greater percentage of men (at least 70%) than women. /Dana Dattelbaum

Bryce: What sort of rocket propellants do you think the scientific community should investigate further, or show promise but haven't been proven experimentally?

[GenImmortal](#)

Why, mine of course! -Bryce