# **ANTIMATTER EXPLOSIONS**



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This image, <u>from CERN</u>, stands for the propositions that: (1) energy and mass are interchangeable quantities (which can be transformed into each other); and (2) when energy is converted to mass, it always does so by producing 50% matter particles and 50% antimatter particles.

About a gram of antimatter is "on the loose" in *Angels & Demons*. While that doesn't sound like much, the destructive power of a single gram of antimatter is extremely significant.

The question becomes: Is it possible to create that much antimatter in a particle accelerator (or elsewhere)? Another way of asking the question is: How much antimatter has ever been created in the history of CERN?

We get the answer to that question from <u>CERN</u> itself.

Only small - very small - quantities of antimatter are produced in particle accelerators (sometimes referred to as "atom smashers"). That's even true in the <u>biggest accelerator</u> which exists today - <u>the LHC</u> (the <u>Large Hadron Collider</u>) at CERN.

If CERN used all of its accelerators to only <u>make antimatter</u>, the company could produce no more than about one-billionth of a gram in a year. If CERN were asked to produce one gram of antimatter - the amount made by Vetra in the story - <u>it would take</u> ... about ... a billion years.

In fact, the total amount of antimatter which <u>CERN has produced</u> in its entire history ... is ... less ... than ten nanograms. Translated into something everyone can understand, that would be enough energy to power a sixty-watt light bulb for about four hours.

Antimatter explosions, thus, are not the same as nuclear explosions. In the former, antimatter annihilates when it touches matter. In the latter, a chain reaction causes the explosion.

Fortunately, antimatter <u>cannot be used as a weapon</u> because there just isn't enough to use for that purpose. But if it ever could happen ... as proposed in the film, <u>Angels & Demons</u> ... <u>watch out!!</u>

See Alignments to State and Common Core standards for this story online at:

http://www.awesomestories.com/asset/AcademicAlignment/ANTIMATTER-EXPLOSIONS-Angels-Demons

See Learning Tasks for this story online at:

http://www.awesomestories.com/asset/AcademicActivities/ANTIMATTER-EXPLOSIONS-Angels-Demons

Media Stream



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### Superconducting Magnets Inside Hadron Collider

Video clip produced by, and online courtesy of, CERN.

PD

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## Superconducting Magnets Inside Hadron Collider, Part 2

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## Superconducting Magnets Inside Hadron Collider, Part 3

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#### Flash of Antimatter

Video clip, from 2000, online courtesy CERN.

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