

# Re: Budget Cuts Will Mean Layoffs at Fermilab

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*Source:* <http://sci.tech-archive.net/Archive/sci.physics/2007-12/msg01317.html>

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- *From:* "hhc314@xxxxxxxx" <hhc314@xxxxxxxx>
  - *Date:* Wed, 26 Dec 2007 10:55:40 -0800 (PST)
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On Dec 25, 5:03 pm, Agent Smith <agent-sm...@two-blocks-on-your-left.com> wrote:

"hhc...@xxxxxxxx" <hhc...@xxxxxxxx> wrote in <news:4bb47984-638e-4351-8ba0-597d50c39...@xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx>:

On Dec 25, 12:24 am, Eric Gisse <jowr...@xxxxxxxx> wrote:

On Dec 24, 6:46 pm, "hhc...@xxxxxxxx" <hhc...@xxxxxxxx> wrote:

[...]

Fusion is, and always will be, the power source of the future.

Eric, I'm perhaps more optimistic about controlled fusion than you, but would compare today's situation with that of 19th century scientists recognizing radioactivity, while having no concept of how to create a useful chain reaction.

It is a fact that a great amount of energy is available via fusion. What to date is missing is a credible method that works on paper to effectively release that energy in a controlled way and harness it. Costly, blind experimentation will not get us there, so as far as I am concerned, it's time to go back to the drawing boards (the theoretical think tanks). We need a totally new paradigm before throwing still

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more money at essentially blind experimentation.

This is why the money has been cut. Several years ago, a maverick within the field, Larry Lidsky, recognized that incremental changes were insufficient to the task, and he proposed doing exactly what you just said. However, he was unable to get anybody else in the fusion community to accept his opinion.

But Washington was apparently paying attention, because that's when the repeated fusion budget started to happen.

I'm optimistic enough to believe that somewhere during the next 50 or 100 years, such a paradigm will exist. On the other hand, if it is discovered, I am not sure that an unlimited supply of virtually free energy would be beneficial to mankind and the earth, realizing that all that energy would end up as heat.

Unfortunately, the supply of energy would be only as "unlimited" as the supply of tritium fuel. – Hide quoted text –

– Show quoted text –

Your assumption that tritium would be the choice fuel for fusion seems premature to me. I'd prefer to wait for the 'New Paradigm' that I've suggested, then see what constraints on fuel selection that it imposes. While today's science focuses on fusion of simple atoms, such as hydrogen and its isotopes because it IS simple to do in an uncontrolled fusion reaction, I tend to look forward to a somewhat more sophisticated process being ultimately discovered for a controlled fusion reaction leading to a practical energy source -- which in itself requires something beyond just a controlled fusion reaction. You have to be able to capture the nuclear energy produced through the reaction, and convert it to provide a practical power source just as a fission reactor of today does. This in turn raises some interesting questions, such as how do you (1) moderate and control a continuous fusion reaction and (2) how do you capture the energy liberated and convert it into a useful and practical power source.

Here is where we again run into the unknown paradigm issue, and it is key to the fusion reaction ever becoming a practical energy and power source. In my mind, any useful continuous fusion process must have a mechanism for moderation, simply to achieve the required negative feedback and reaction stability, plus a mechanism to "scram" the reaction if needed in emergencies. It also must provide a mechanism for capturing the liberated energy either electrically or thermally. Lacking either of these two mechanisms, the fusion reaction has the

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potential for doing a great deal of unintentional damage; damage consistent with turning a city the size of Chicago into a large, radioactive crater! Of course, a paradigm for such a fusion reactor does not even exist today, however I believe that Steve Jones in his paper speculating on catalyzed fusion existing in the deep magma, focused thinking in a new direction (unfortunately leading some clueless folks into the Cold Fusion fiasco). At any rate the Jones paper for a time focused fusion researchers in a direction quite different from the Stellerators, Tokomaks, etc., into a new direction of thought. Other theories no doubt will follow over the years, and I will predict that some day a graduate student researcher at MIT, Harvard, Chicago, or Cal Tech will be sitting in their tiny apartment with a pad of paper (actually today the method is that you use boxes of fan-fold computer or teletype paper) and in his or her many pages of computations and notes will see something interesting new unveiling itself before them...and that will be the eureka moment. That's traditionally been the way that science makes its greatest breakthroughs!

I still worry about what all that newly revealed source of energy, and ultimately heat, will do to life here on planet earth.

Harry C.

p.s., Above of course is largely my speculation as a older physicist, so the the predicted 'New Paradigm' on fusion may never exist. Still, since the potential energy does exist within nuclear structures, I'm predicting that someone will eventually find a way to liberate and apply/exploit it.