Open Question: Should Fermilab consider joining the effort on R&D for Accelerator based Transmutation of nuclear Waste (ATW)

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- Context
- Technical aspects
- Area of common interests
- Thoughts...

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Perhaps a bit preposterous to ask...but..

- Big decisions on National – or even world-wide - energy policies is above my pay scale. Meanwhile, it is clear to me that the use of nuclear energy will surge again, here and abroad. Despite energy conservation measures, and renewable sources, our appetite for energy consumption is growing, world-wide.
- And building new reactors without addressing the following grave concerns is irresponsible :
  - ***Safety concerns of the reactor complex (mostly done)***
  - ***Waste Disposal -> Waste burning (here we could come!)***
  - ***Proliferation of Plutonium (to be solved politically)***
- **Ultimately, if we can build efficient accelerators, sub-critical Thorium-based reactors could mitigate the Pu proliferation problem, by burning existing stocks and what is produced in conventional reactors, or breeders.**

ATW

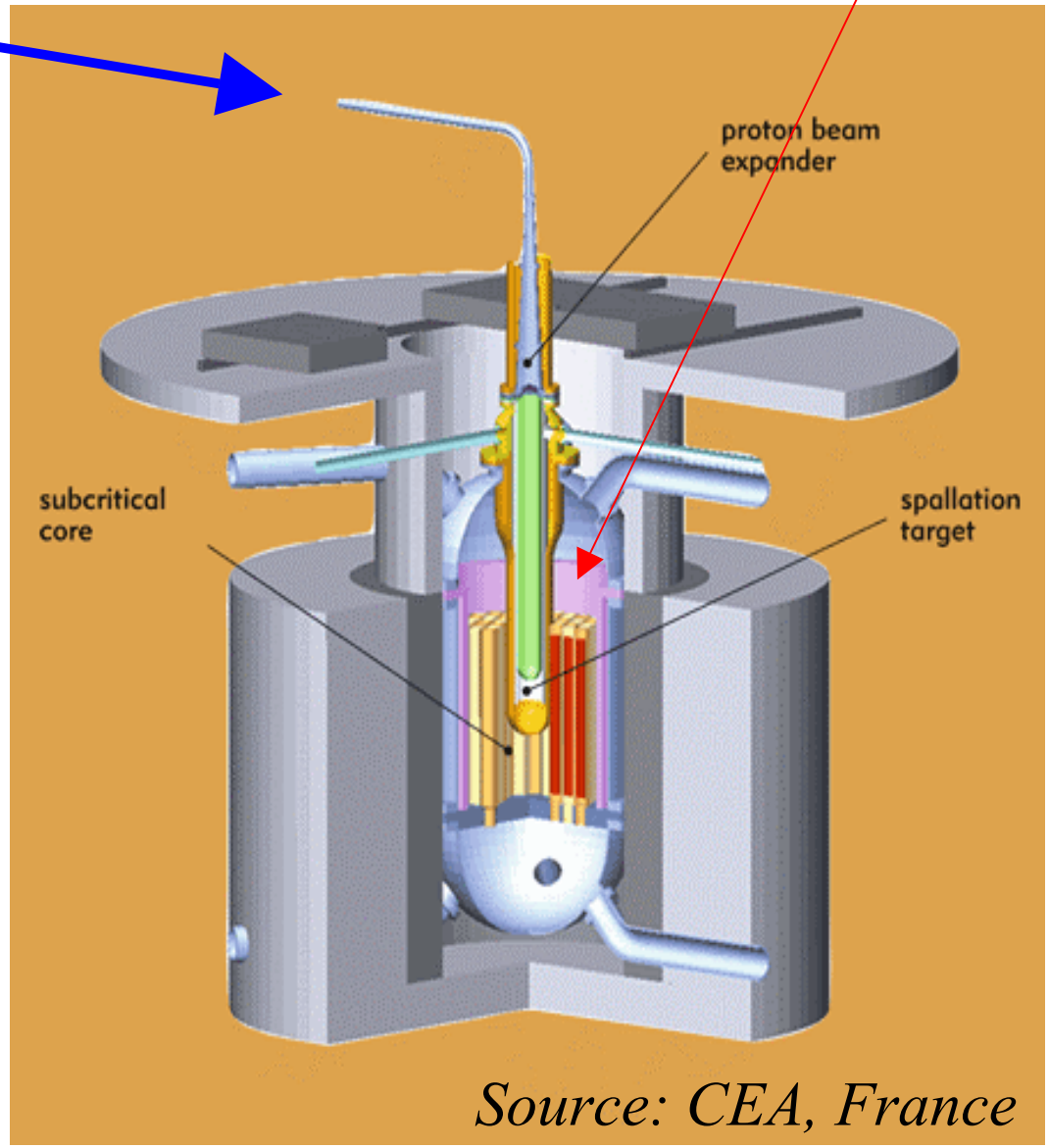
Beam ?

~1 GeV, tens of MW, CW (prefered)

None of this nasty stuff on site, please!!

Machines?

- Cyclotrons (*early designs, they seems unlikely to work due to space charge and extraction loss*)
- SCRF-Linacs: prefered solution
- Must be very efficient!!(makes no sense to build a 10 MW accelerator requiring 1 GW reactor to power it !)
- And cheap !



Source: CEA, France

Technical areas of common interest..

- Superconducting Linacs! (e.g. A proton driver)
- Superconducting R.F.
- Energy Saver : efficient r.f. power sources and cryo-modules.
- Beam Halo mitigation measures
- Space Charge Simulation.
- Multi MW targets (or beam dump)
- Robotics for accelerators.
- ...

Thoughts..

SNS and Los Alamos (LANL) are better equipped for this project than we are. True! For instance, there is also great overlap between the Tritium production facility (APT) and the ATW (very unfortunately). However, one could ask: is a weapon lab most suitable for developing a peaceful use of nuclear technology? As far as SNS is concerned, we need to collaborate with them - and we already are, I believe, - should the SCRF-Linac Proton Driver becomes a reality.

While this is going on, can we afford to state to our congressman(s), who ultimately could promote Nuclear Energy, that we don't do anything useful on that front ?

Claiming that we have nothing to do with ATW's, is in fact not quite true: as we proposed and possibly build the SCRF Proton Linac/driver, we are and will train a new generation of beam physicist familiar with this technology.

We may not like this discussion, but can we really ignore it?

And meanwhile, we might contribute to the construction of safe reactors for neutron and neutrino physics!

To know more...

- Abroad..
  - http://www.cea.fr/gb/publications/Clefs46/pagesg/clefs46_31.html
  - http://www.nea.fr/html/trw/intro/ens.html
  - The type of accelerator development presented at PAC03 http://warrior.lbl.gov:7778/pacfiles/papers/TUESDAY/AM_POSTER/TPAB047/TPAB047.pdf
- U.S. :
  - '99 ATW study : http://www.pnl.gov/atw/ReportToCongress/
  - The spekptical response..(May 24 2000) http://www.ieer.org/reports/transm/hisham.html
  - Recent talk (Aug. 2003) : http://www.apt.lanl.gov/documents/pdf/LA-UR-02-6772.pdf