

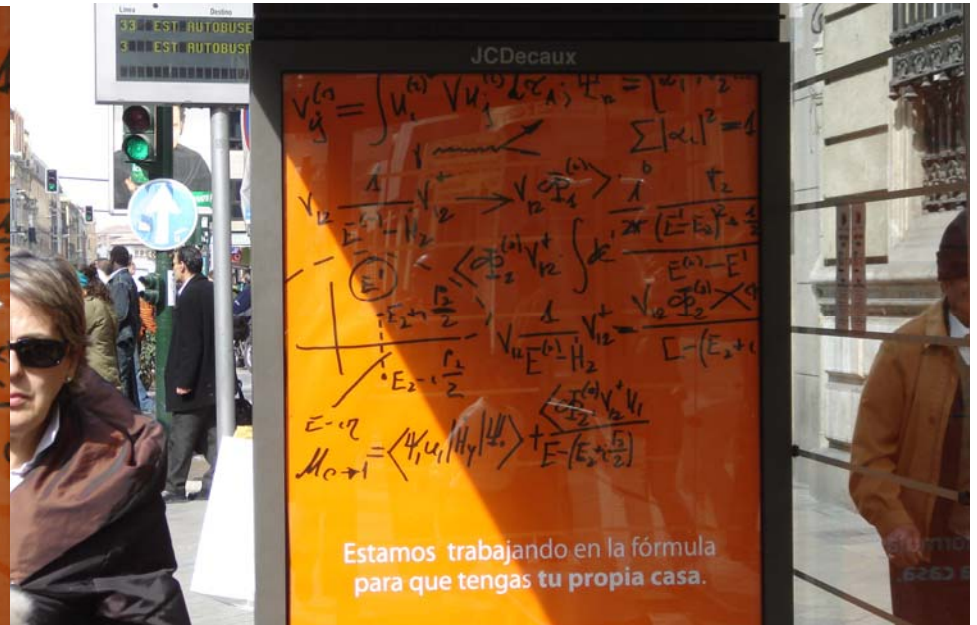
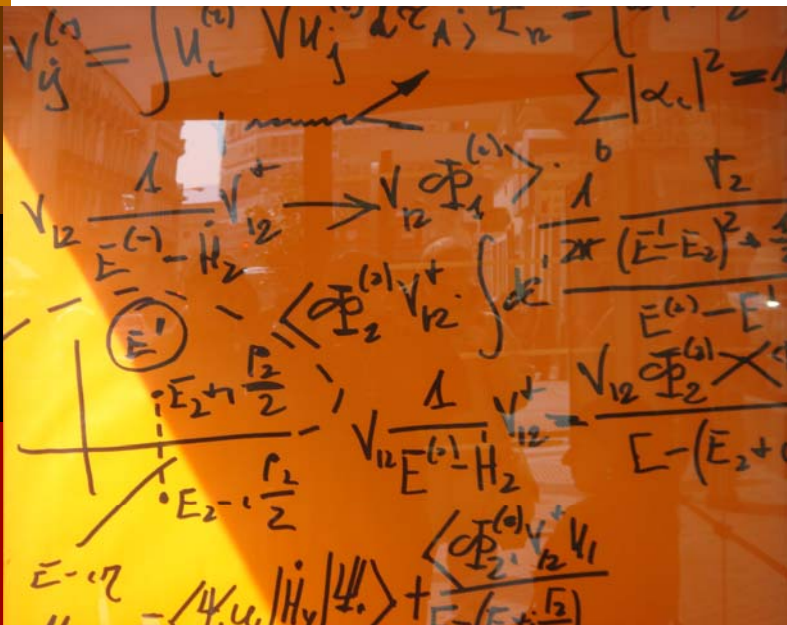


Nuclear Physics

in Astrophysics

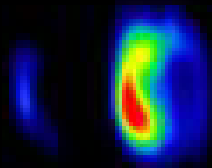
at Notre Dame

Michael Wiescher

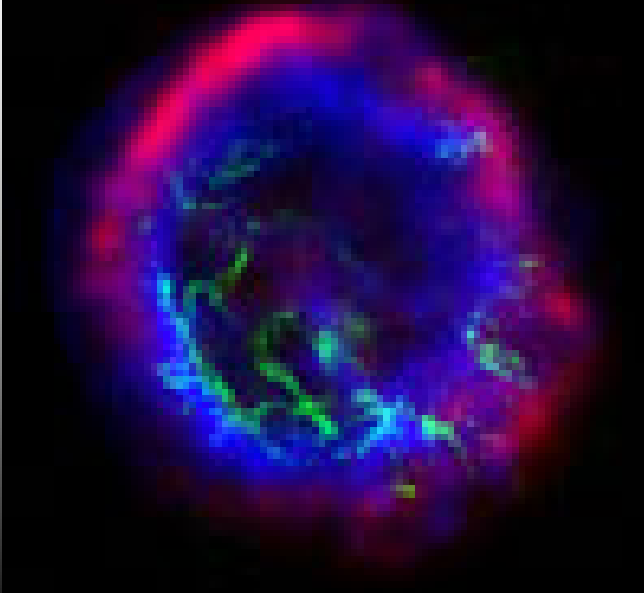


Scientific Goals

nova



supernova



the sun



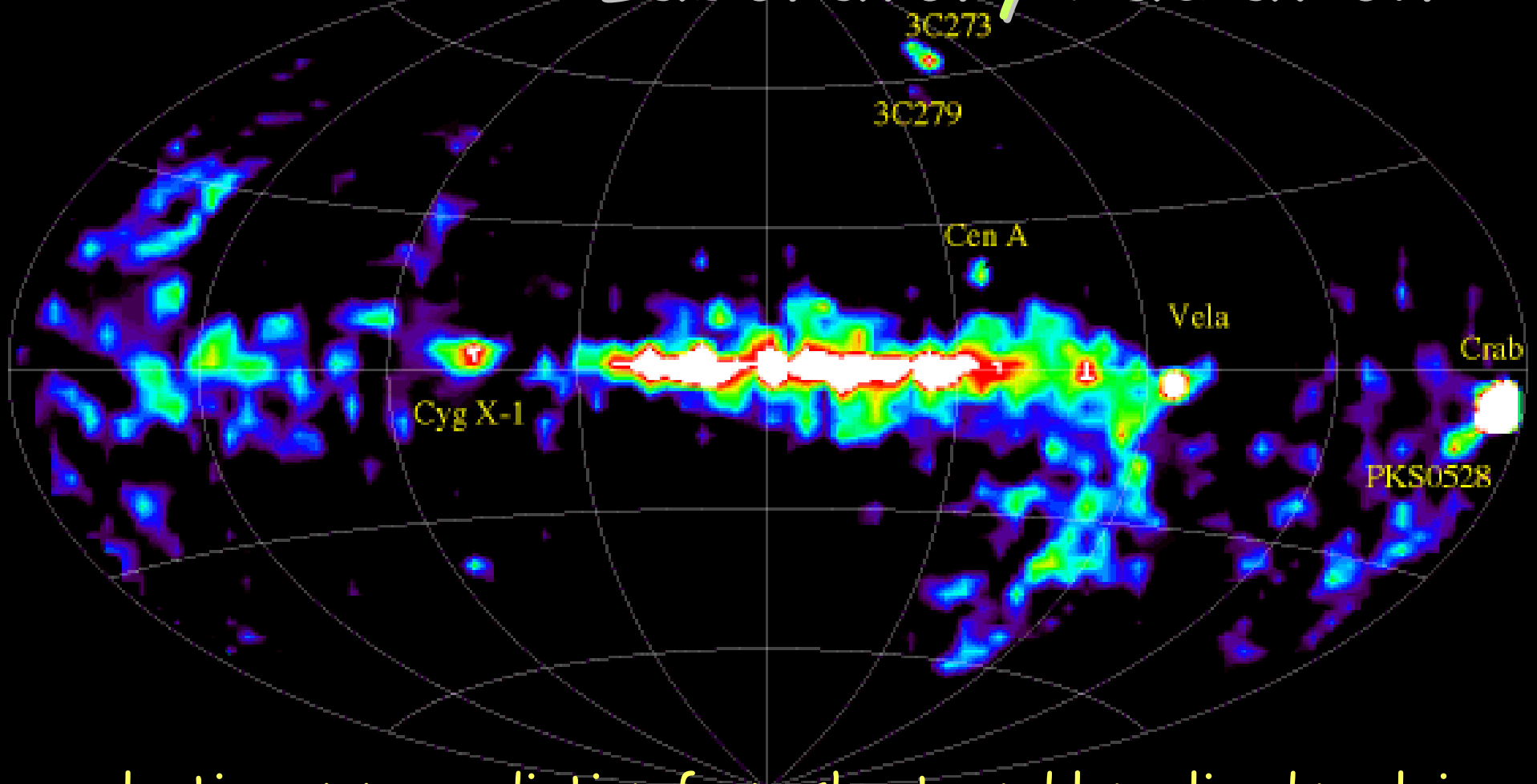
Nuclear Processes
in Stellar Evolution
& Stellar Explosion

the nuclear engine

- for creating the elements
- for setting the time scale
- for generating the energies!



From Galactic to Laboratory Radiation



galactic gamma radiation from short- and long-lived nuclei



Experimental Program

- Notre Dame: reactions in stellar H/He-burning
- Notre Dame: Building and testing of St. George
- n-ToF CERN: n capture in the s-process
- NSCL MSU: processes in stellar explosions
- **FUTURE FACILITIES**
RIA & DUSEL

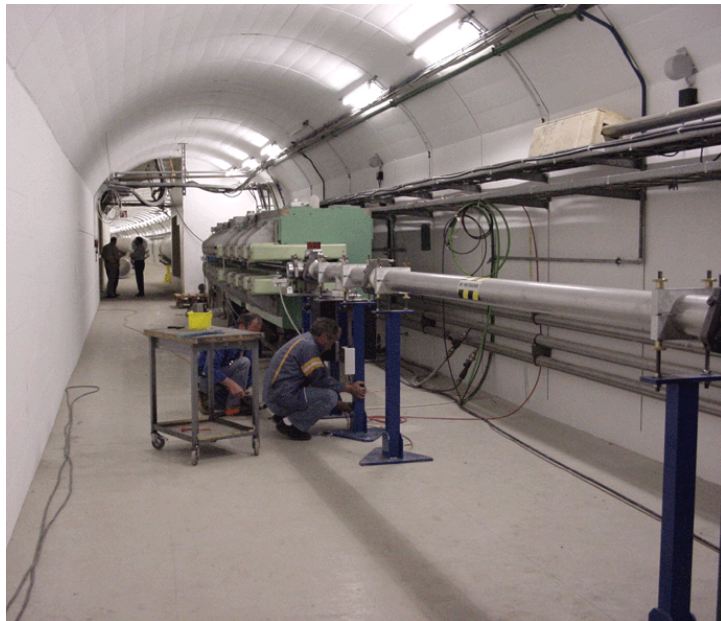
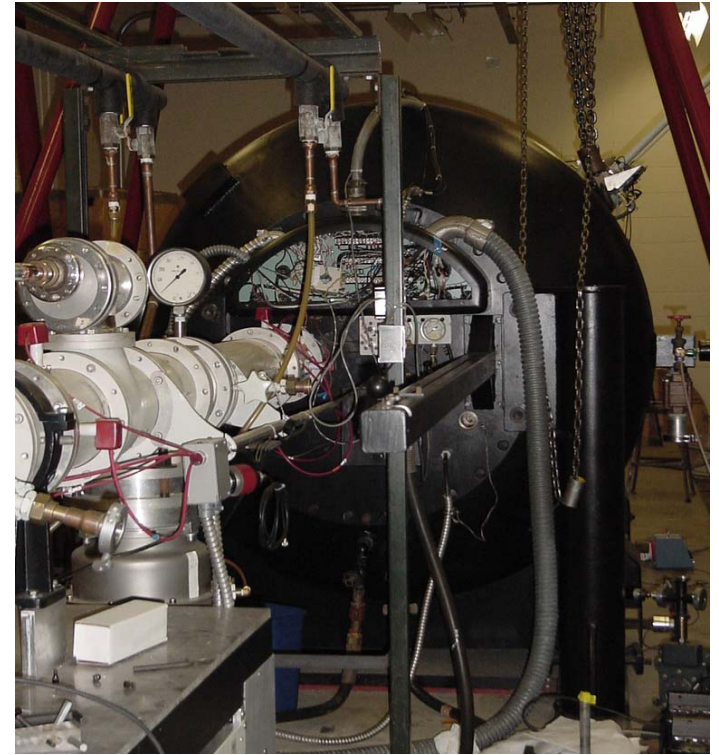


Theory Program

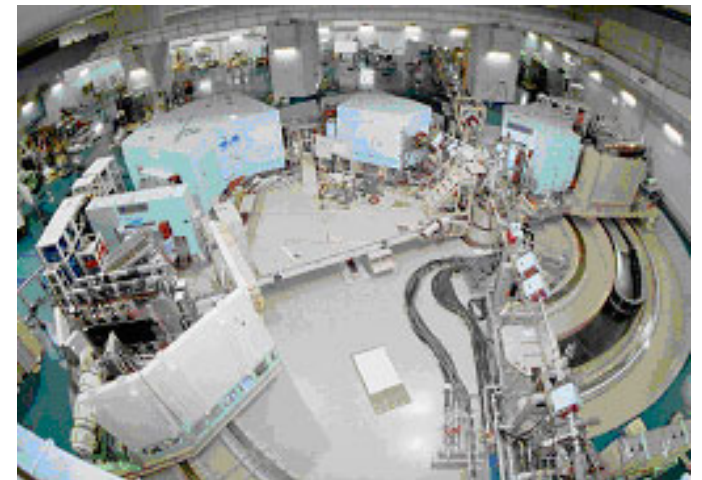
- thermonuclear reaction **rates**
- pycno-nuclear reaction **rates**
- nucleosynthesis simulations **for**
AGB stars & SN shock **front**
- nuclear processes in
novae and X-ray bursts **ts**
- JINA participation at
ASU, ANL, LANL, **LBNL**

Workplaces

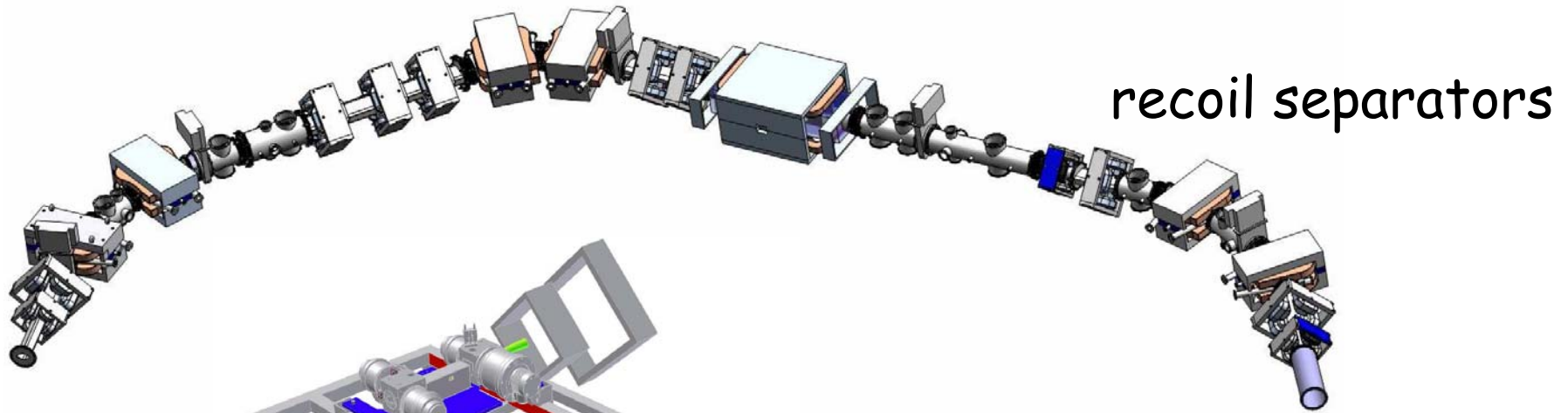
From the NSL dungeons
to other laboratories in
the US, Europe & Japan



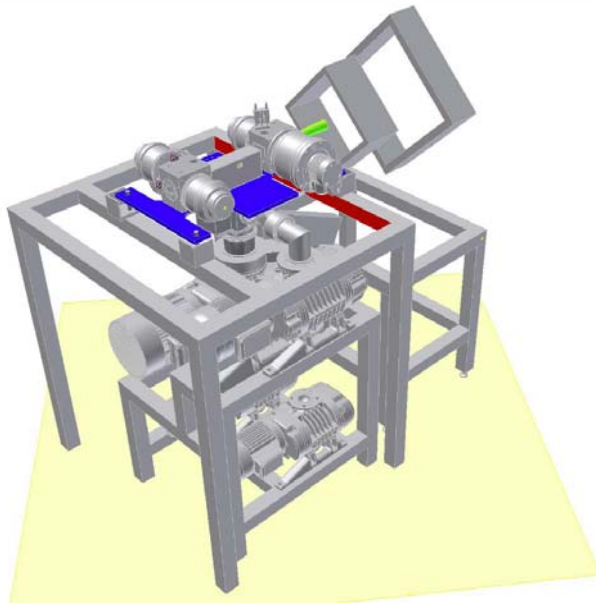
to measure in only 4 graduate student
years the nuclear reaction processes
that take stars
4 billion years
or supernovae
4 microseconds



New Developments



recoil separators



Gas target technologies

Dungeons underground



Cosmic Ray Simulations

Accelerators provide
5 MeV Radiation distribution

Collaborative project

Jay LaVerne, RadLab
Michael Wiescher, NukeLab

Bombardment of asteroid material
leads to the formation of complex
"organic" molecules, the first step to
LIFE - Astrobiology



Ask for Advice & Guidance!

present students: Annalia Palumbo (2008)

P. J. LeBlanc (2009)

Shawn O'Brien (2009)

Mary Beard (2009)

James DeBoer (5th year)

Georgios Magkotsios (4th year)

Ethan Uberseder (3rd year)

Antonios Kontos (3rd year)

Andreas Best (3rd year)

Qian Li (2nd year)

...

..

.

Additional information: www.JINAweb.org
www.physics.nd.edu/Faculty/wiescher.html

gone: Jason Daly 2005 (Navy Consultant)

Claudio Ugalde 2005 (ANL)

Aaron Couture 2006 (LANL)

Hye Young Lee 2007 (LANL)

Elisabeth Strandberg 2007 (Lockheed Martin)