

Virginia Accelerator Driven Systems (ADS) R&D Center

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**Virginia ADS Consortium
International Symposium On Hydrogen In Matter
(ISOHIM)**

TEA7, San Francisco

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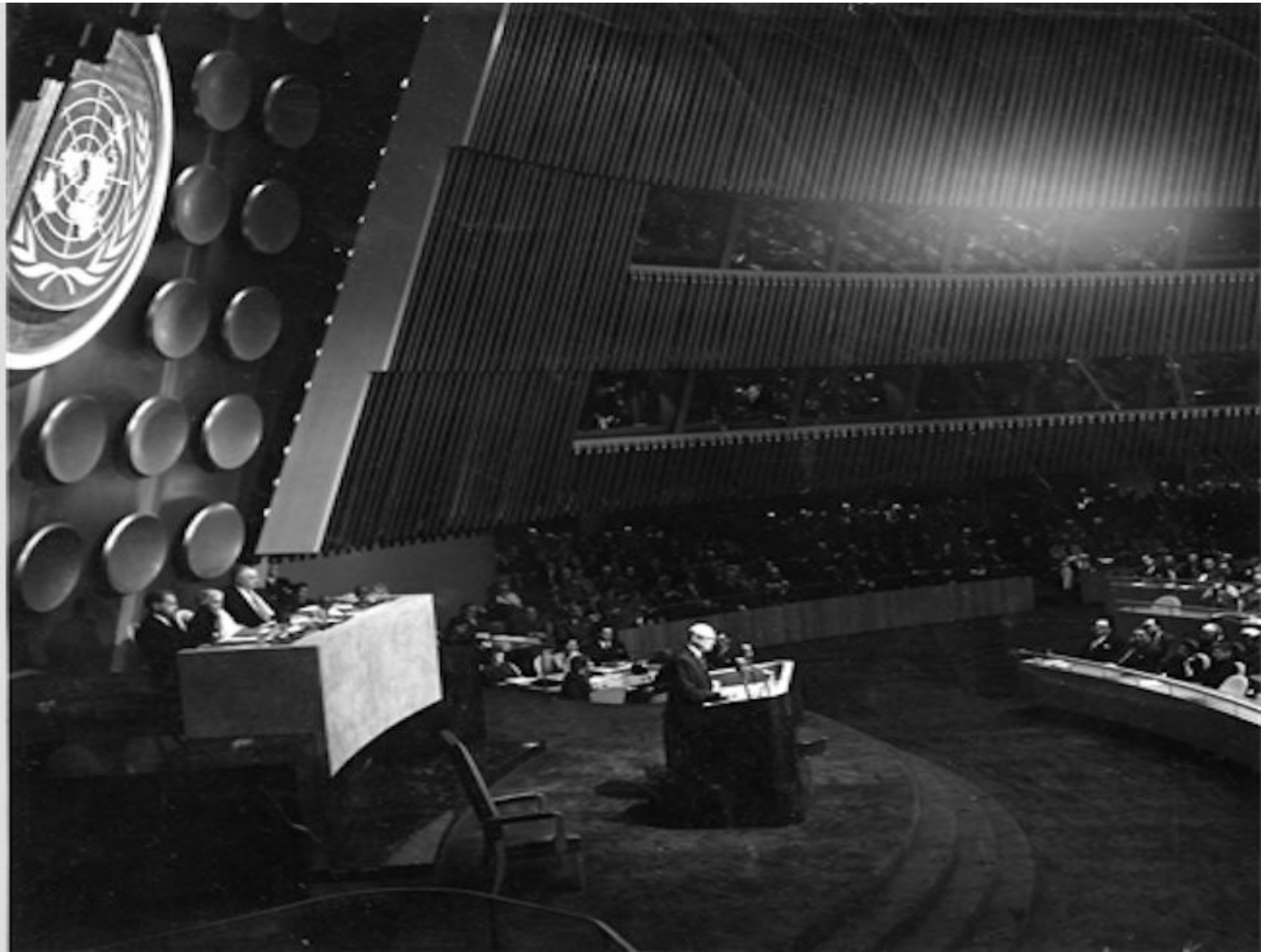
Outline

**USA Atoms for Peace Announcement
1953, D. D. Eisenhower – IAEA**

**India's 3 stage nuclear energy
program 1954 – Homi Bhabha**

ADS world wide Project plans

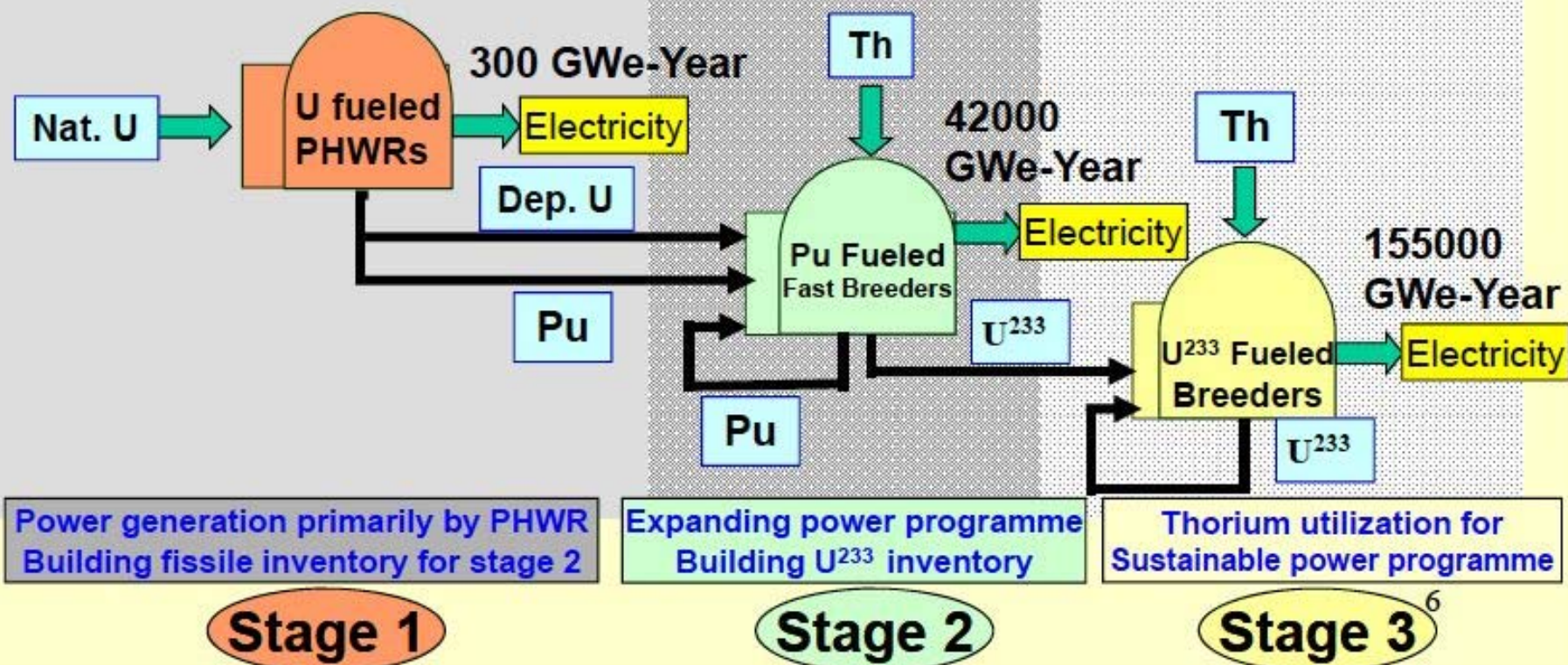
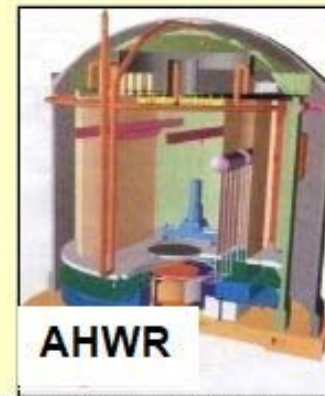
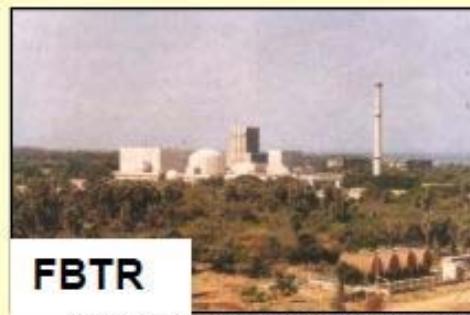
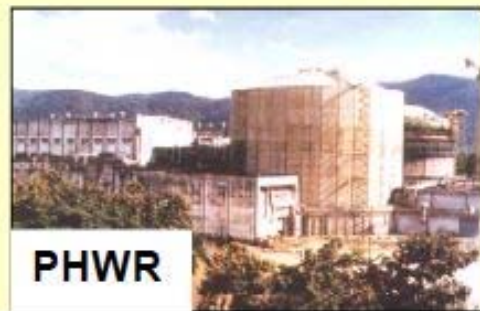
Summary





Three-Stage Indian Nuclear Programme

Thorium in the centre stage



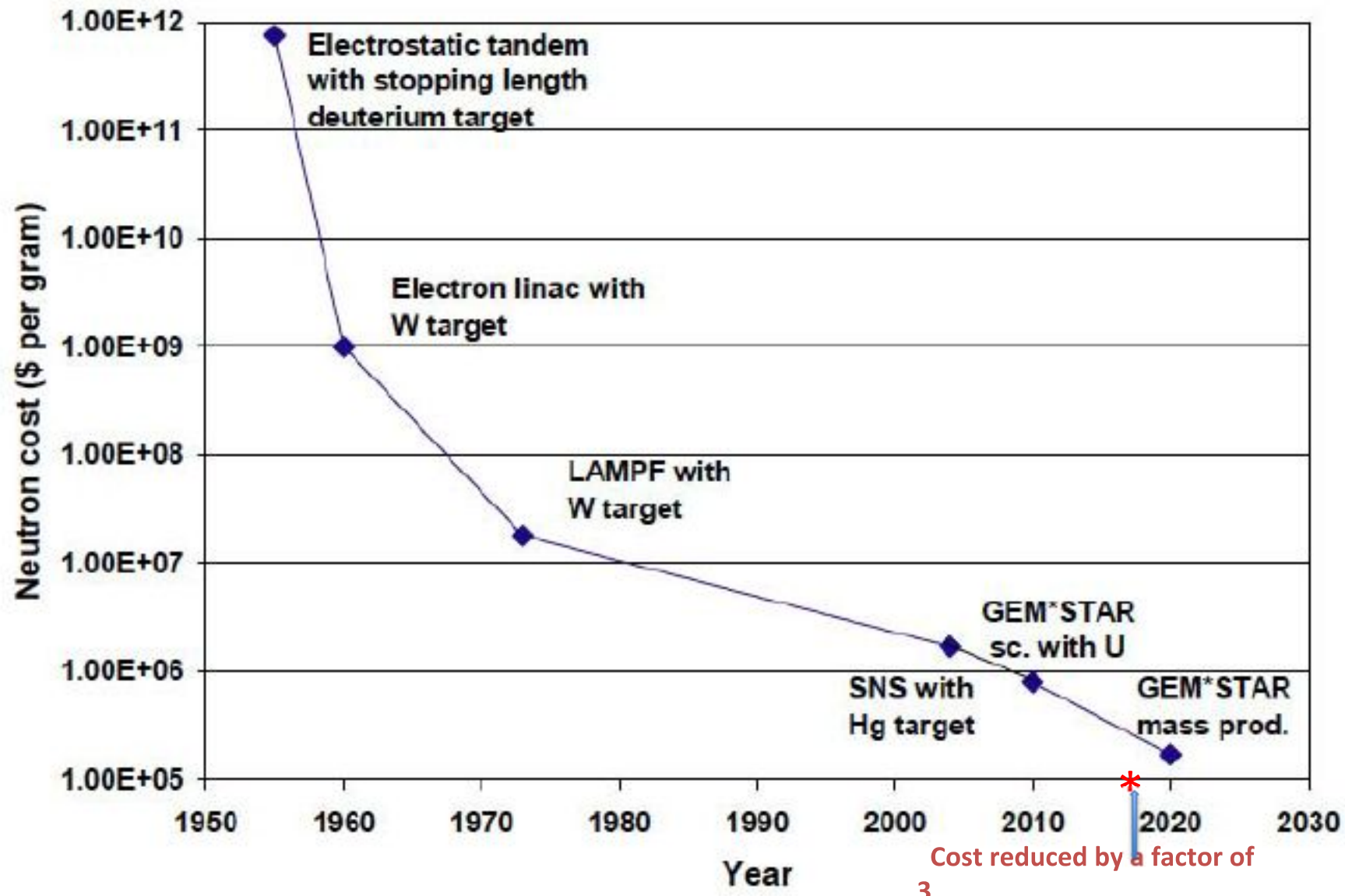
Brief Early History of ADS



- ❖ **1950 – U. E. O. Lawrence, High power accelerators for producing fissile materials**
- ❖ **1952 – W. B. Lewis, proposed use of thorium with intense neutron generator**
- ❖ **1992 – V. Bowman, Energy generation with ATW**
- ❖ **1993 – C. Rubbia, Energy amplifier**

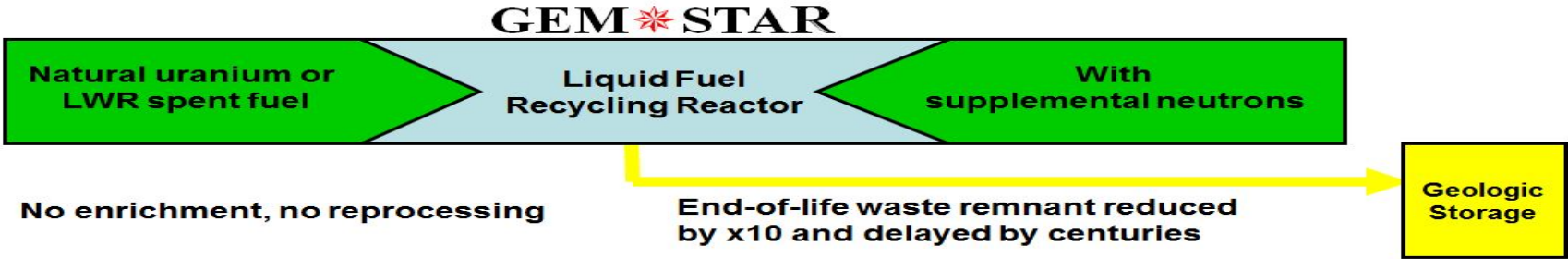
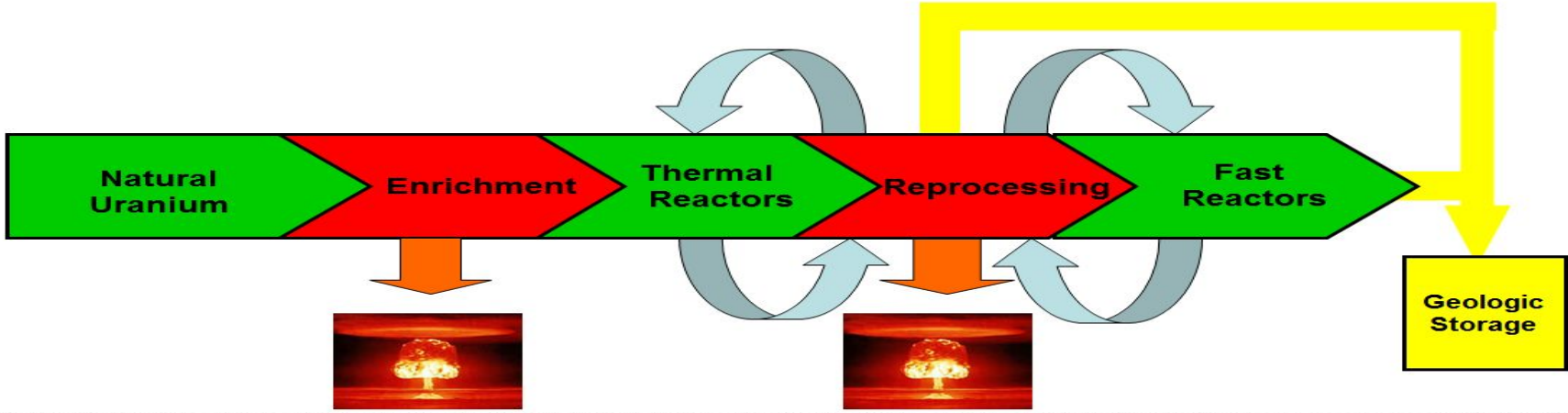
Thorium – non proliferation, no melt down, safe and least NRC involvement

Charlie Bowman's Neutron Cost Estimates



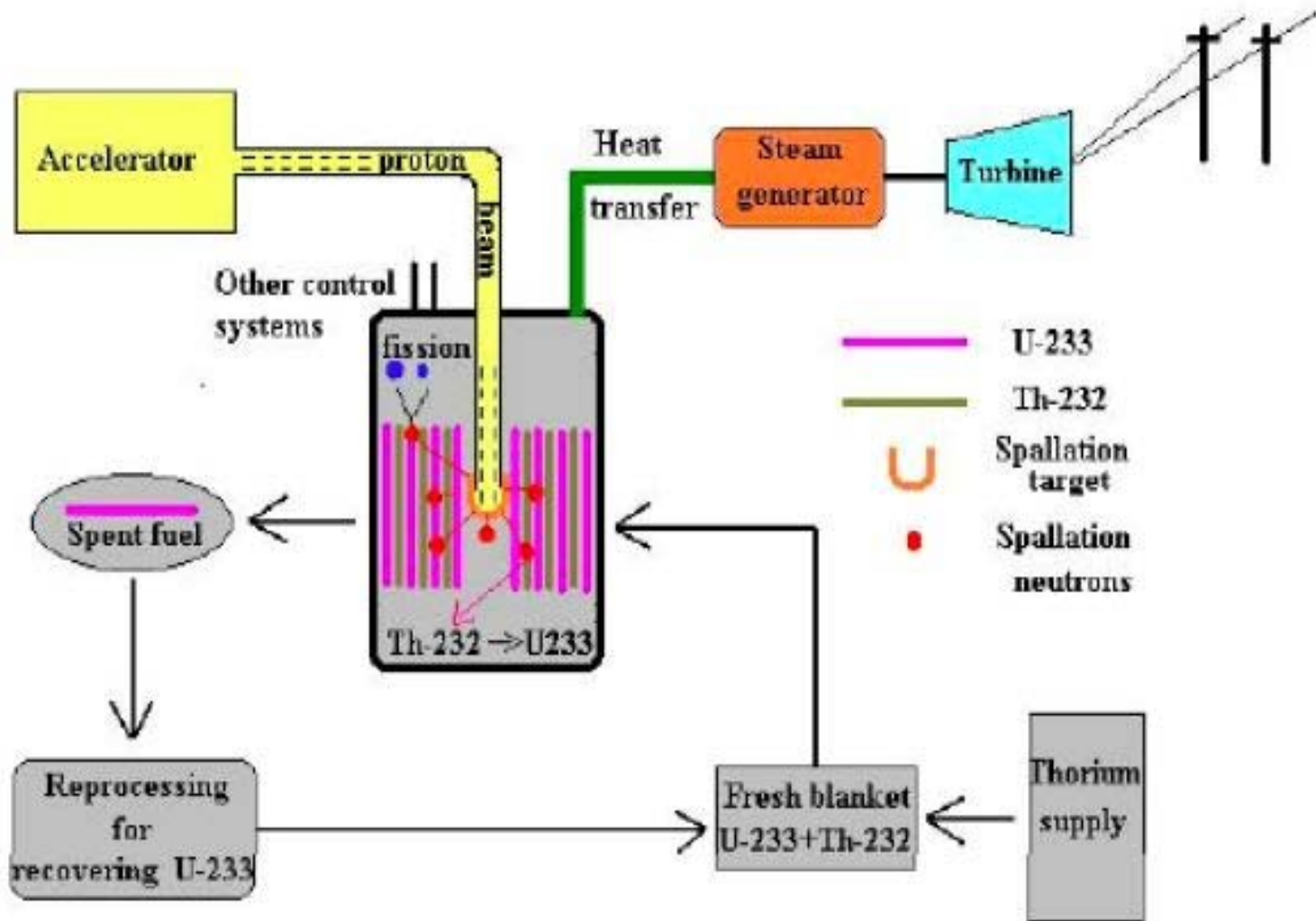
GEM*STAR

Paradigm Shift



Vogalar, VT

India's Thorium Utilization Scheme



Dr. S. Banerjee, University of Virginia Presentation, May

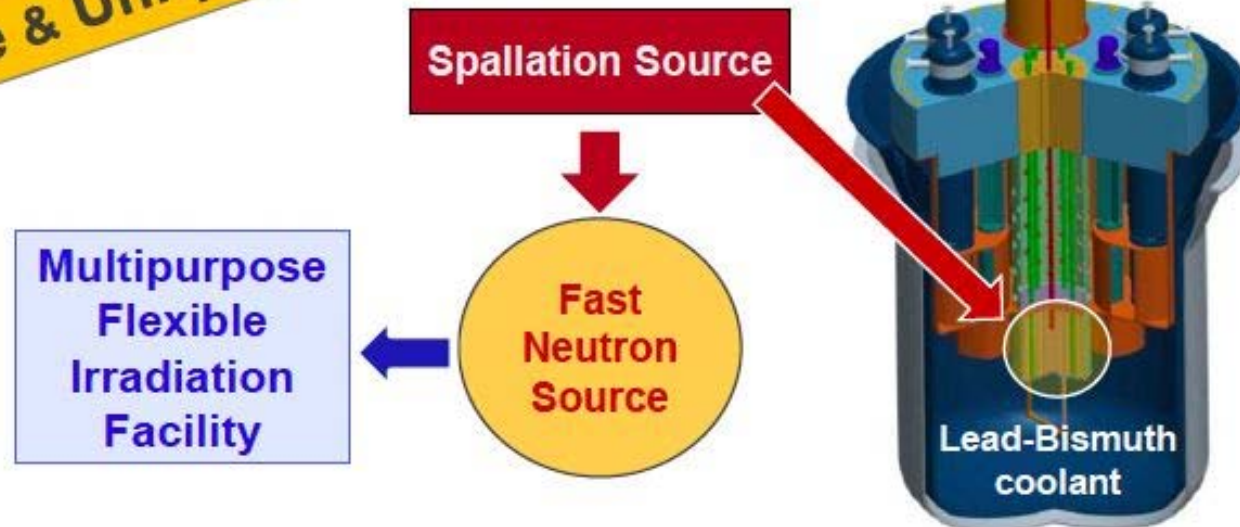
2010

World's 1st ADS Project

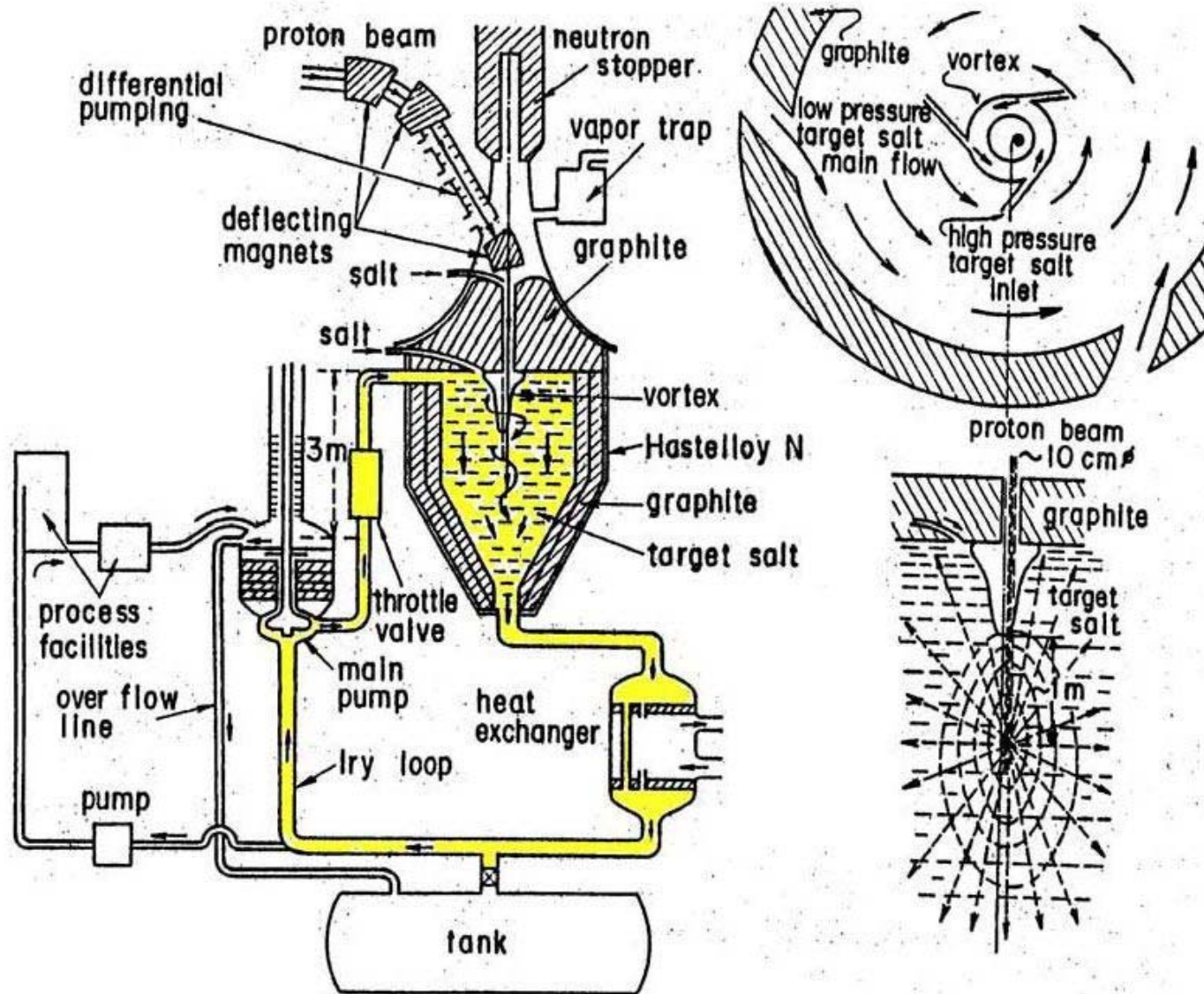
MYRRHA - Accelerator Driven System



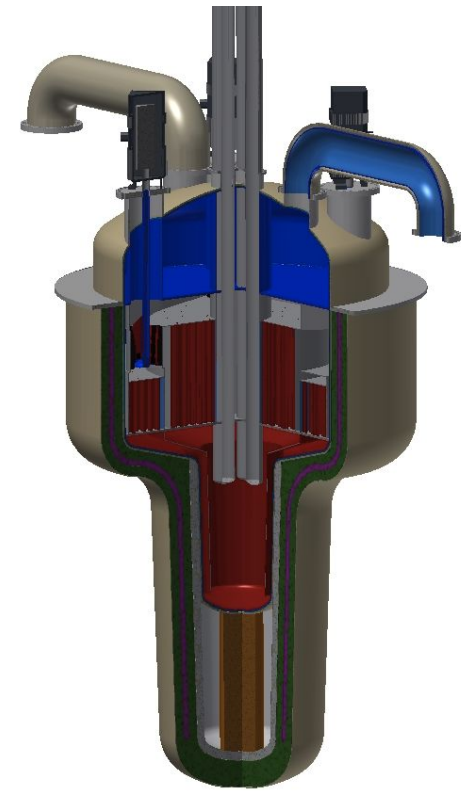
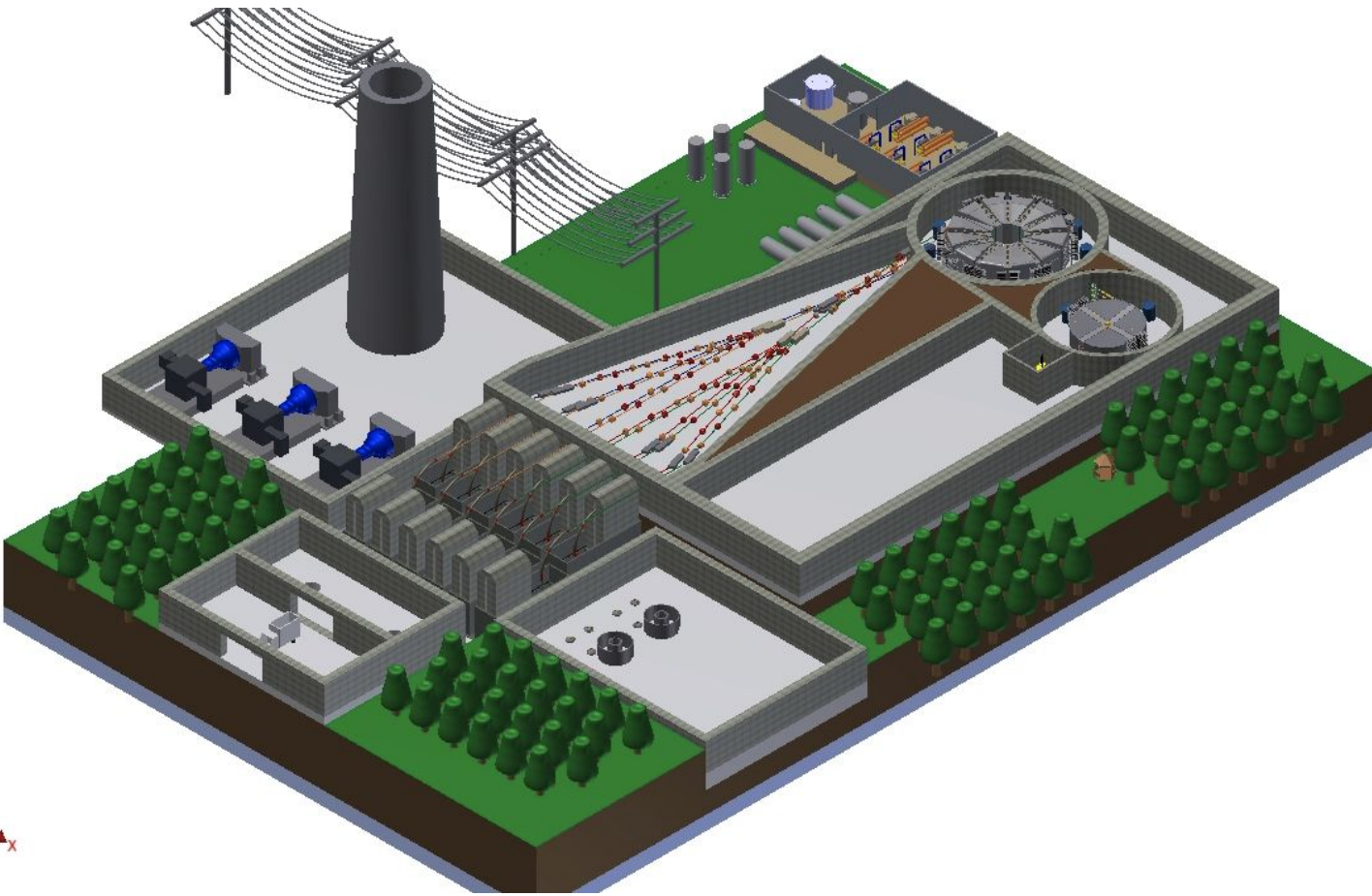
Innovative & Unique



K. Furukawa's AMSB



Accelerator-Driven subcritical fission in A Molten salt core: Closing the Nuclear Fuel Cycle for Green Nuclear Energy



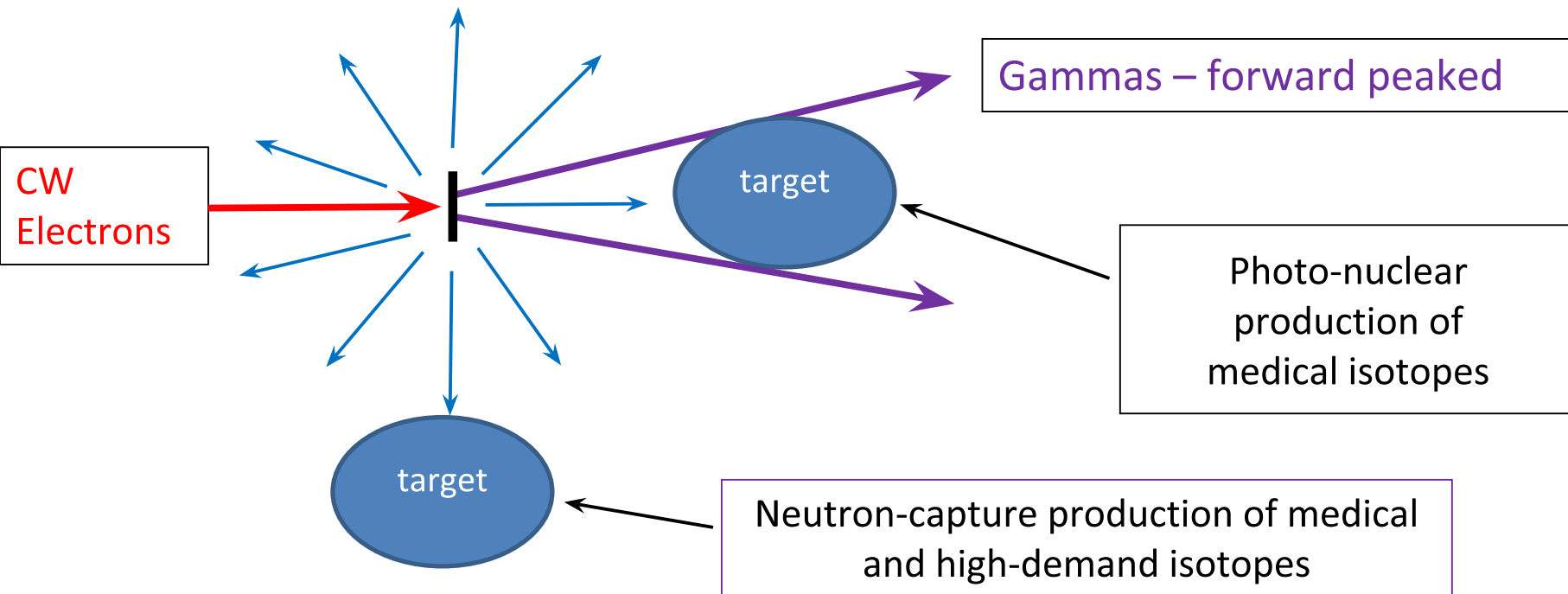
Peter McIntyre, Texas A&M University
For the ADAM Collaboration

Potential VNEFRC location adjacent to JLab



Neutron/gamma source for isotope developments

Neutrons – emitted in all directions: approximately isotropically



A 100 kW, 100 MeV electron linac is capable of producing 100% of the U.S. demand for many high-priority research isotopes for medical, industrial and other kinds of research. Such a device could also produce nearly 10% of the entire U.S. demand for ^{99}Mo .

Schematic of the VNEFRC 100 MeV, 100 kW system

Thermionic Electron Gun, 200 keV & 1 mA

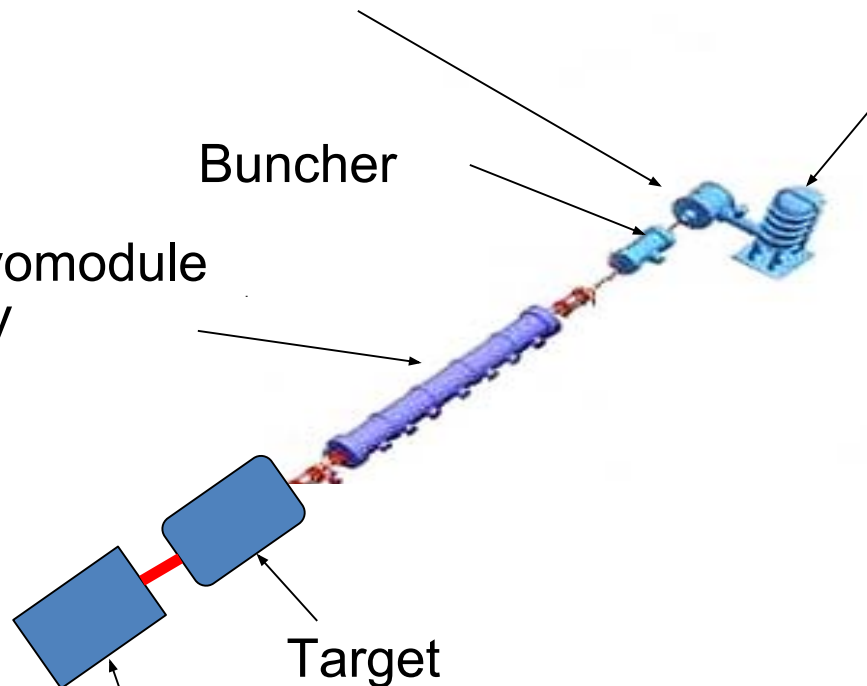
200 kV High Voltage Power Supply for Gun

Buncher

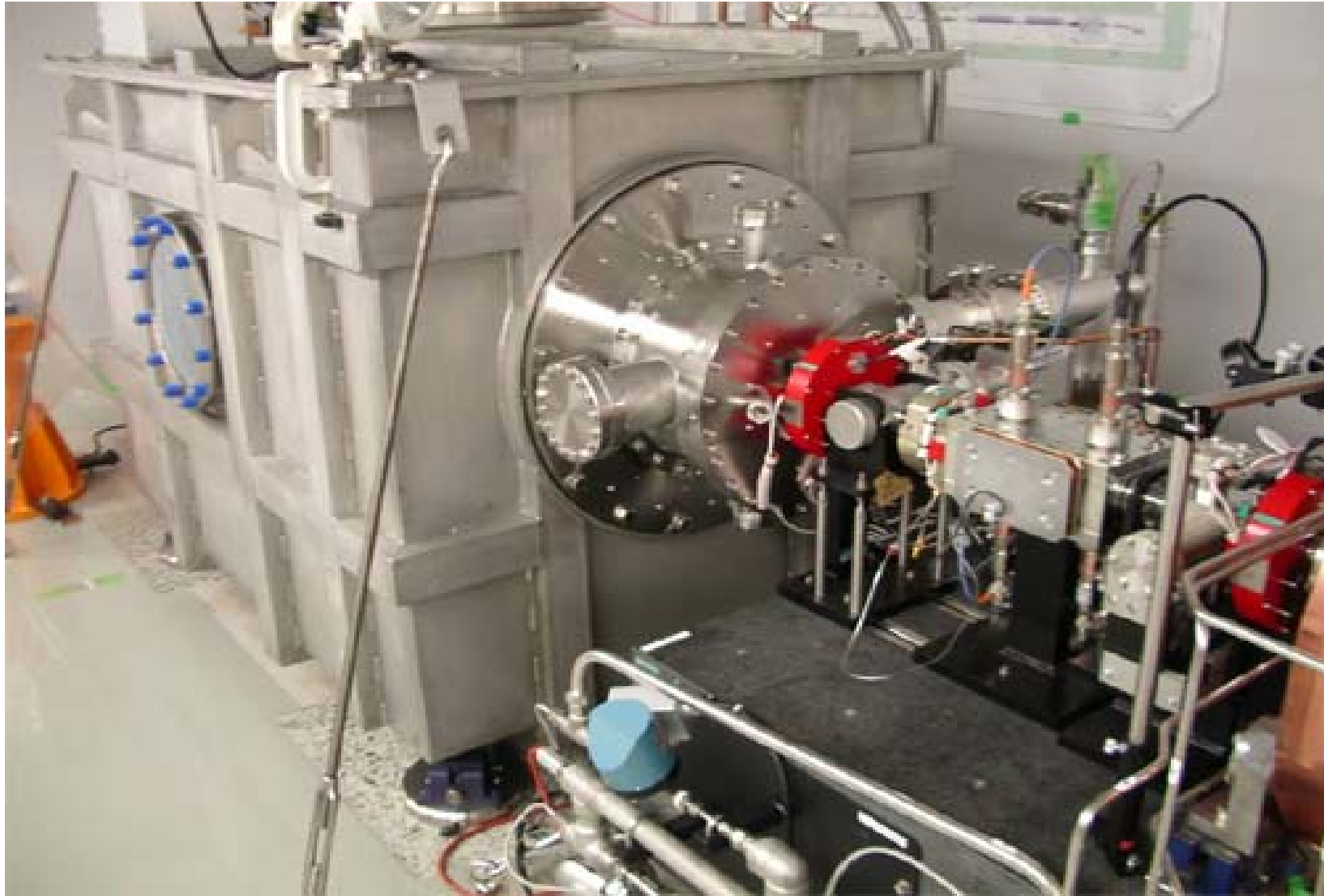
SRF Cryomodule
100 MeV

Target

100 kW Electron
Beam Dump



JLab Thermionic Gun



JLab's 100 MeV CW SRF Linac



ADS&ThU International Workshops

1st International ADS&ThU Workshop 2010

- <http://www.phys.vt.edu/~kimballton/gem-star/workshop/index.shtml>

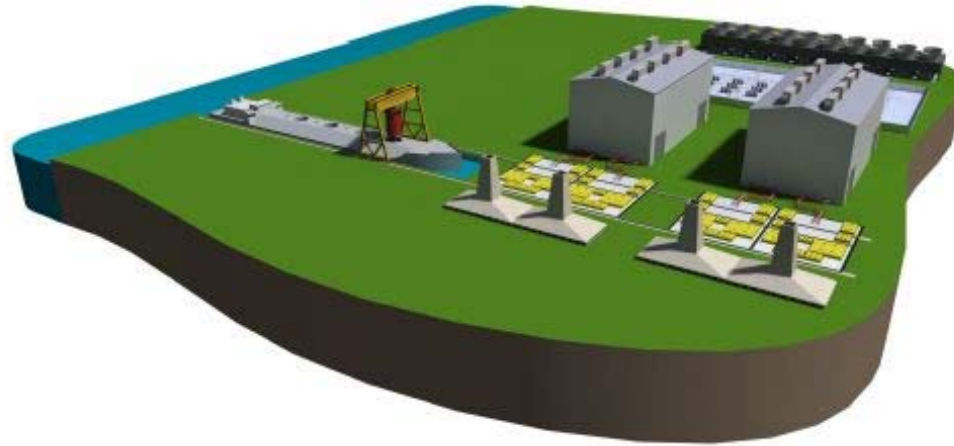
2nd International ADS&ThU Workshop 2011

- <http://www.ivsnet.org/ADS/ADS2011/>

3rd International ADS&ThU – Oct 14-17, 2014

- <http://adsthru.org/index.html>

ThorConPower DMSR



Goal: cheap, dependable, carbon-free electricity. *Now*.

- ***Producible***. Must be cheaper than coal. Must be scalable to large volume manufacturing.
- ***Fixable***. Major failures have modest impact on plant output.
- ***Full scale prototype within four years***.

Summary

- **Closed fuel cycle reactors and ADS ThU systems require at least another 25 years for maturity**
- **Molten Salt Reactors can be built now to provide carbon free-economic generation of heat and/or electricity for the health and prosperity of the humanity that are eagerly looking to those of us already enjoying**

Acknowledgements

**Virginia ADS Consortium Institutions, VNECA and VEC
for their encouragement and help**

International Symposium On Hydrogen In Matter (ISOHIM) Publications

Hydrogen in Materials and Vacuum Systems AIP CP 671

<http://www.virtualjournals.org/dbt/dbt.jsp?KEY=APCPCS&Volume=671&Issue=1>

Hydrogen in Matter AIP CP 837

<http://www.virtualjournals.org/dbt/dbt.jsp?KEY=APCPCS&Volume=837&Issue=1>

Single Crystal Large Grain Niobium AIP CP 927

<http://www.virtualjournals.org/dbt/dbt.jsp?KEY=APCPCS&Volume=927&Issue=1>

Superconducting Science and Technology of Ingot Niobium AIP CP 1352

<http://scitation.aip.org/dbt/dbt.jsp?KEY=APCPCS&Volume=1352&Issue=1>