



**The Abdus Salam  
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**1858-1**

**School on Physics, Technology and Applications of Accelerator Driven  
Systems (ADS)**

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**Engineering Design of the MYRRHA .  
Part I**

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# Engineering Design of the MYRRHA Proof-of-Principle ADS Facility

Didier De Bruyn

On behalf of the MYRRHA team at SCK•CEN

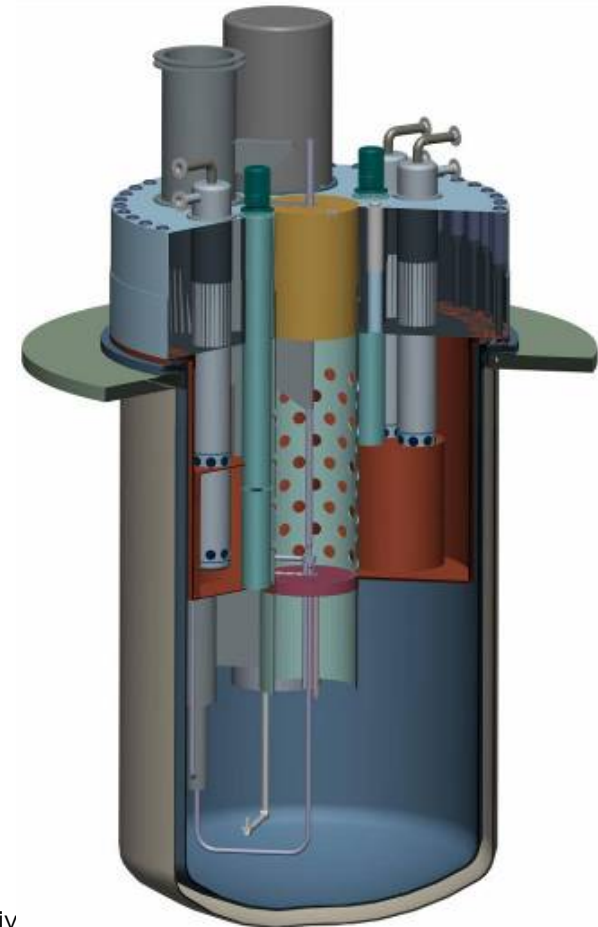
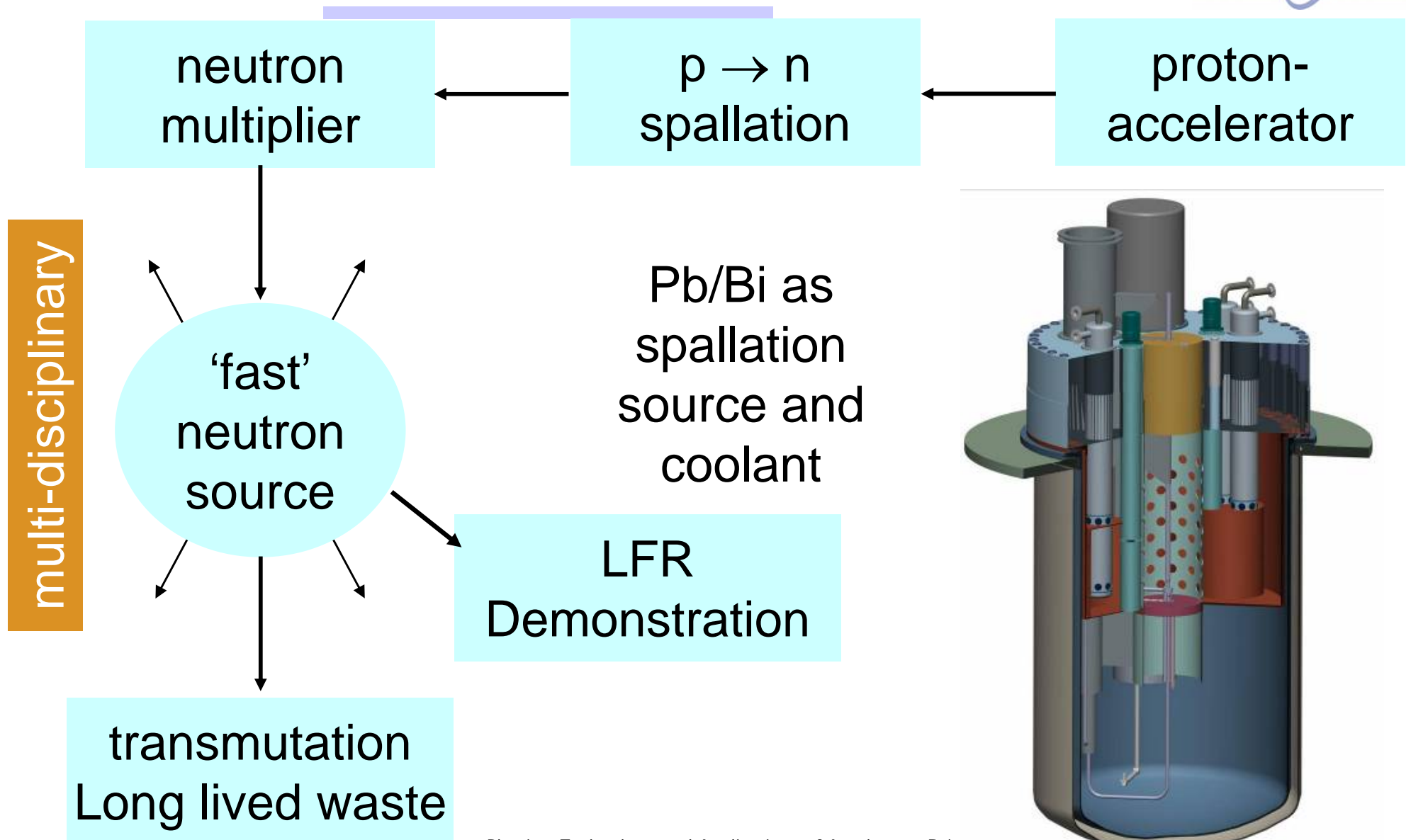


- History of MYRRHA project
- The 2005 design, internally called “Draft-2”
  - Fuel pin & fuel assembly design
  - Neutronics calculations
  - Primary system design
  - System operation, inspection, maintenance
  - (these chapters were presented at the 2005 workshop)
- (afternoon) Exercises on fuel design
- (afternoon) From the 2005 MYRRHA design to the EUROTRANS XT-ADS design



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# The MYRRHA-concept

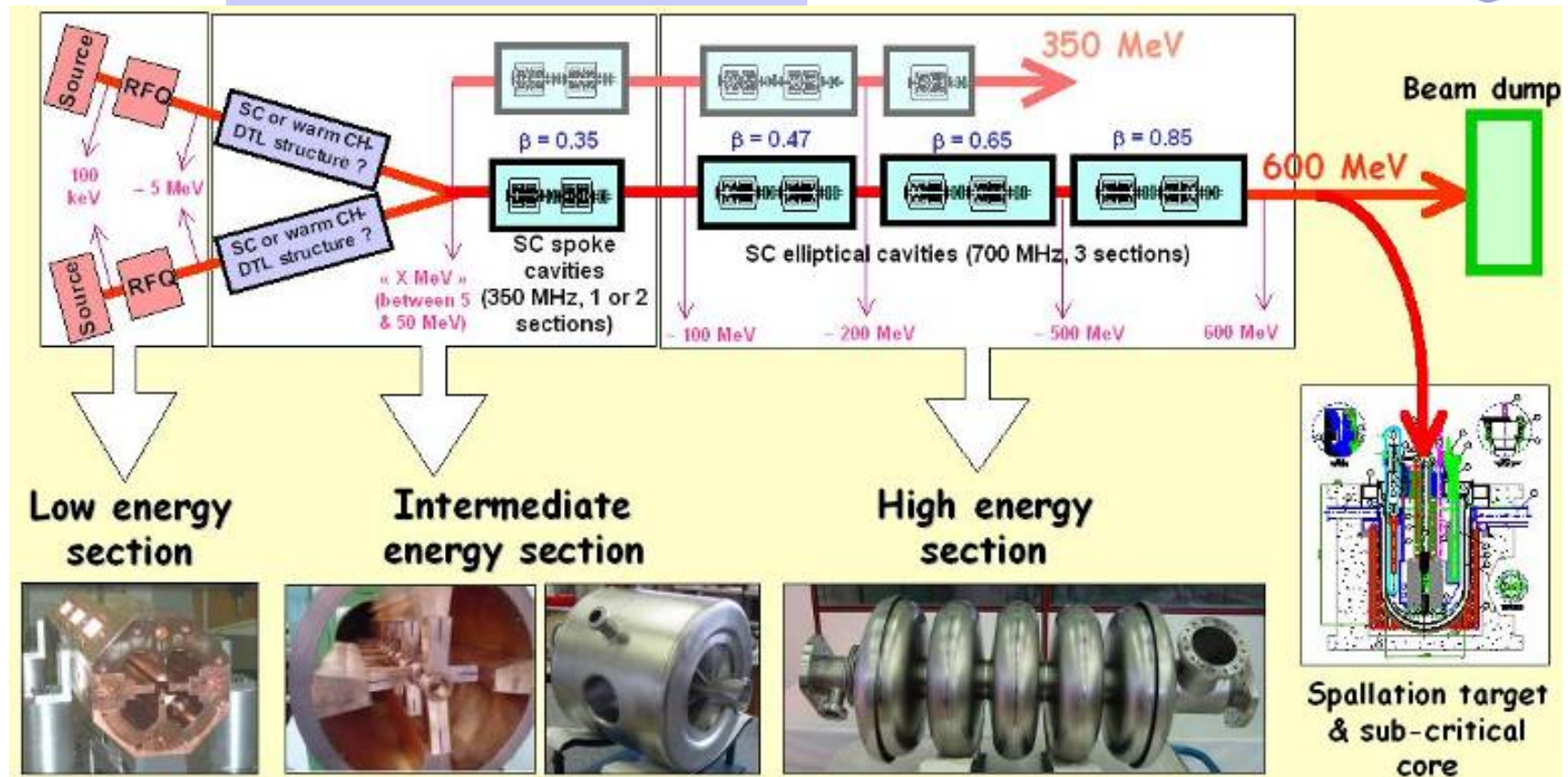


## The purpose: MYRRHA is to be:



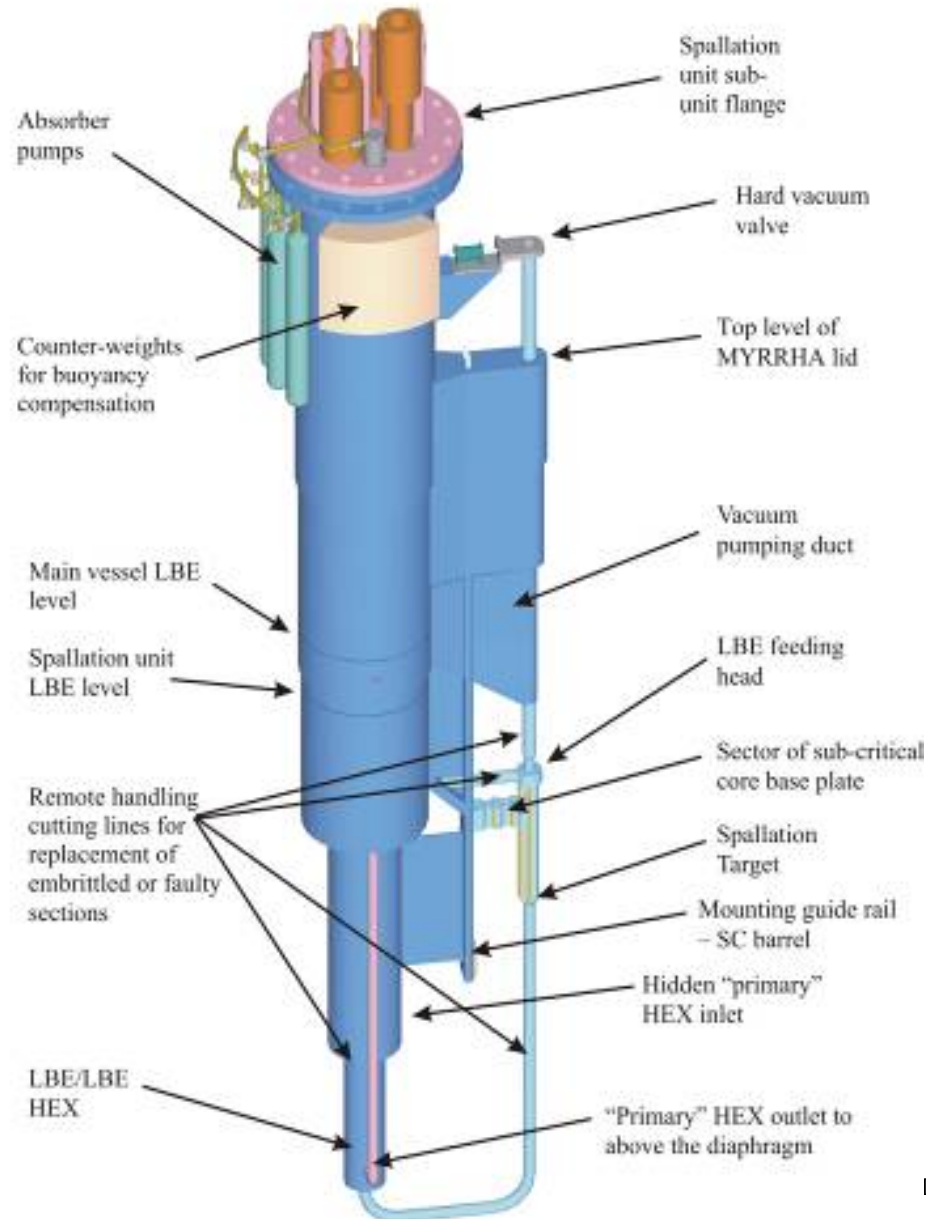
- A flexible irradiation testing facility in replacement of the SCK•CEN MTR BR2 (100 MW)
- An attractive fast spectrum testing facility in Europe for Gen.IV and Fusion
- A full step ADS demo facility and P&T testing facility
- A technological prototype as test bench for LFR Gen.IV
- An attractive tool for education and training of young scientists and engineers
- A medical radioisotope production facility

# Accelerator: The LINAC solution



- Strong R&D & construction programs for SC linacs are underway worldwide
  - Spallation Sources for Neutron Science,
  - Radioactive Ions & Neutrino Beam Facilities,
  - Irradiation Facilities

# The Windowless spallation target





# The benefits and drawbacks of Pb-Bi



- ☺ Undergoes spallation
- ☺ Reasonable melting temperature (123 °C)
- ☺ Water can be used for the secondary cooling
- ☹ High coolant density (steel and fuel float)
- ☹ Opaque: blind fuel handling
- ☹ Possible problems deposits of high melting point phases
- ☹ Bi activates into Po
- ☹ Compatibility of Pb-Bi with structural & cladding materials to be addressed by design

## Some key dates



- MYRRHA started as a collaboration project between SCK•CEN (B) and IBA (B) in 1998,
- ... since then enlarged to other partners through bilateral collaboration agreements (CEA, CNRS, ENEA, FZK, CIEMAT, JAEA, ISTC, OTL, IUS\_KTU, IPUL, ...); we made the 2005 design;
- ... since March 2005 serves as basis of the experimental ADS (XT-ADS) under development within the FP6 integrated project EUROTRANS within a consortium of 48 partners, for 4 years;
- ... the evolution from MYRRHA to XT-ADS is presented this afternoon.



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