EUROPEAN SPALLATION SOURCE

Introductions

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Proposed Solutions

- Survey
- Model
- New shielding prototypes to control hadronic showers and resulting particles
- Active shielding / veto

Objectives

- To share knowledge about the “prompt pulse” and “streaming neutron” problem(s)
- To combine our efforts in understanding how these contaminants are propagating around the facilities
- To test new solutions together that can benefit all of our facilities

European Partners

SNS

ESS Chief Instrument Engineer

Detector Group

Kalliopi Kanaki

Richard Hall-Wilton

PSI

Uwe Filges

Neutron Optics Group

Phil Bentley

Nataliia Cherkashyna

Instrument Background

- Efforts now focussed on high energy background shielding, as the other requirements are well understood

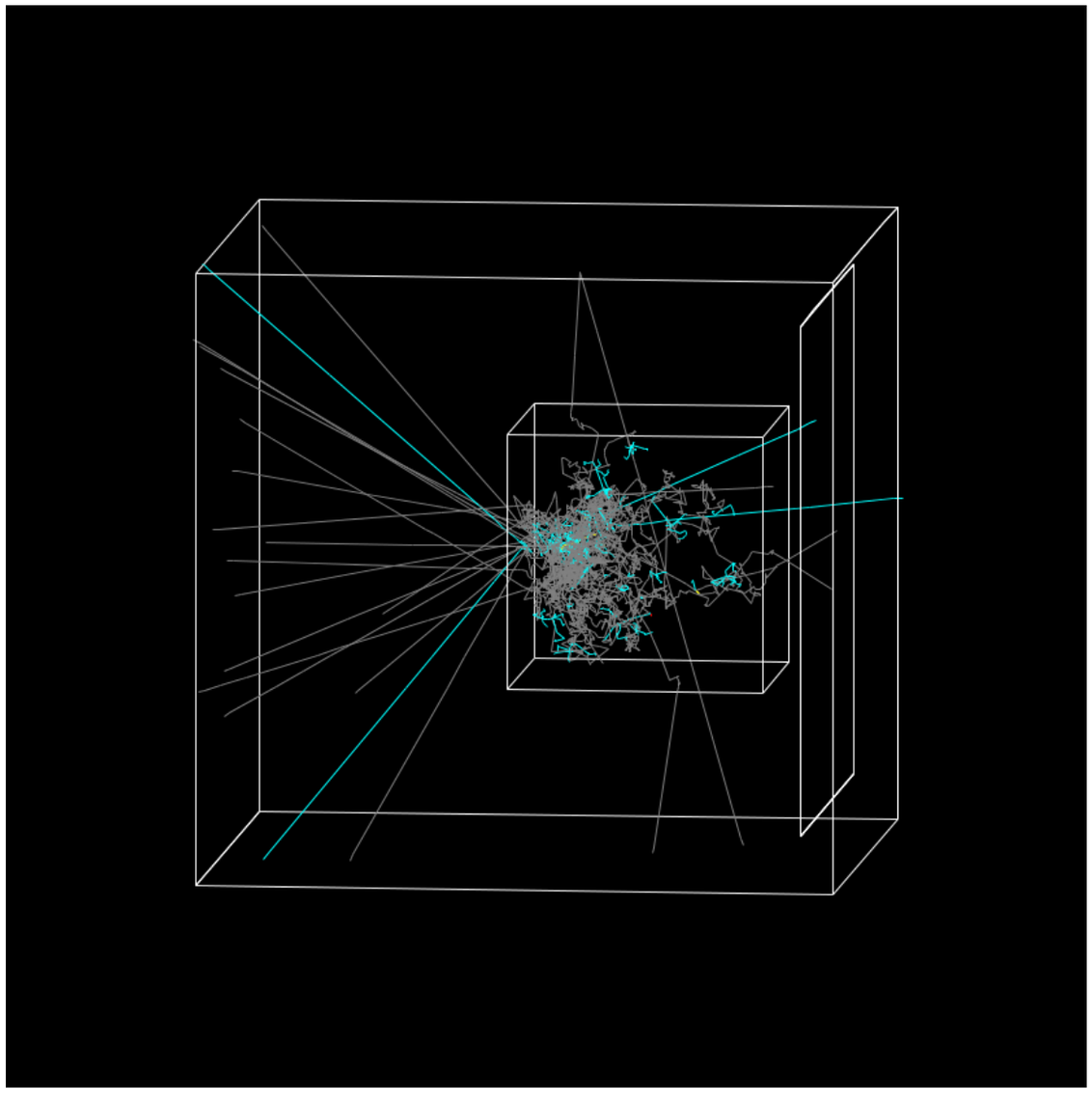
	Low Energy < 20 MeV	High Energy 20 MeV – 3 GeV
Biological Shielding	Known territory at reactors, low risk	Known territory at spallation sources, low risk
Background Shielding (in particular “Prompt pulse”)	Known territory at both research reactors and spallation sources, low risk	Existing designs at neutron facilities have proved insufficient at high energies, but potentially useful concepts exist in the physics community, e.g. CERN.

New Types of Background Shielding

- Strong emphasis now on controlling hadronic showers

- Based on work at CERN involving calorimeters for measuring hadron energies at TeV scale (within a few yards)

- Laminate structures with materials that have high stopping power



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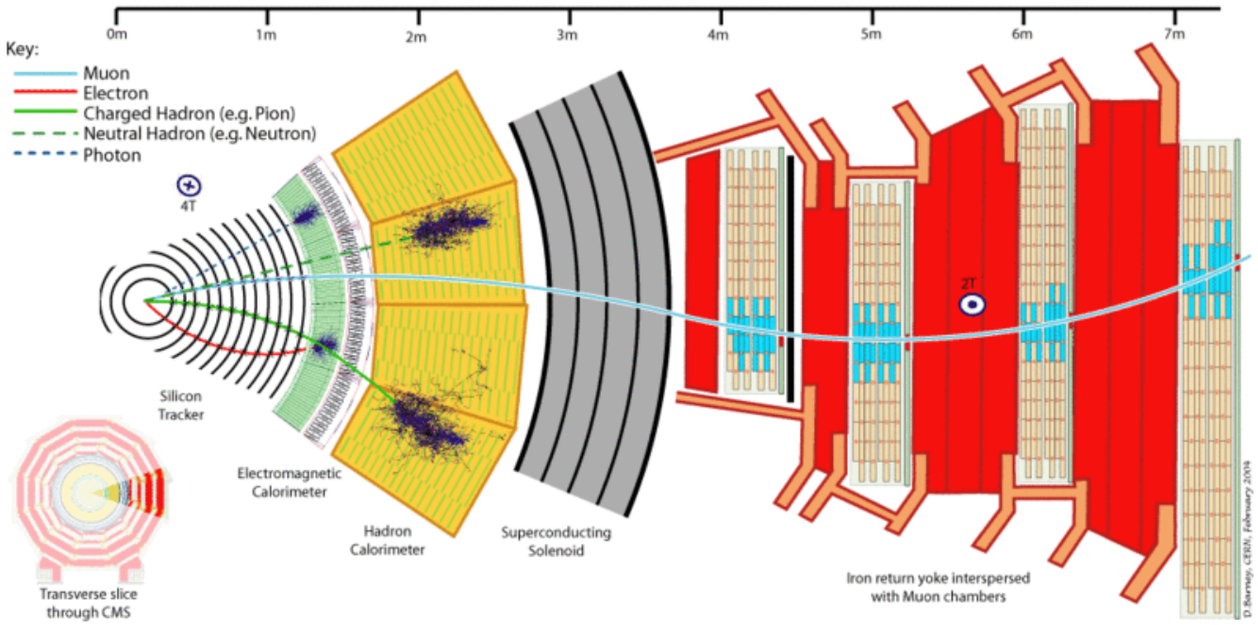
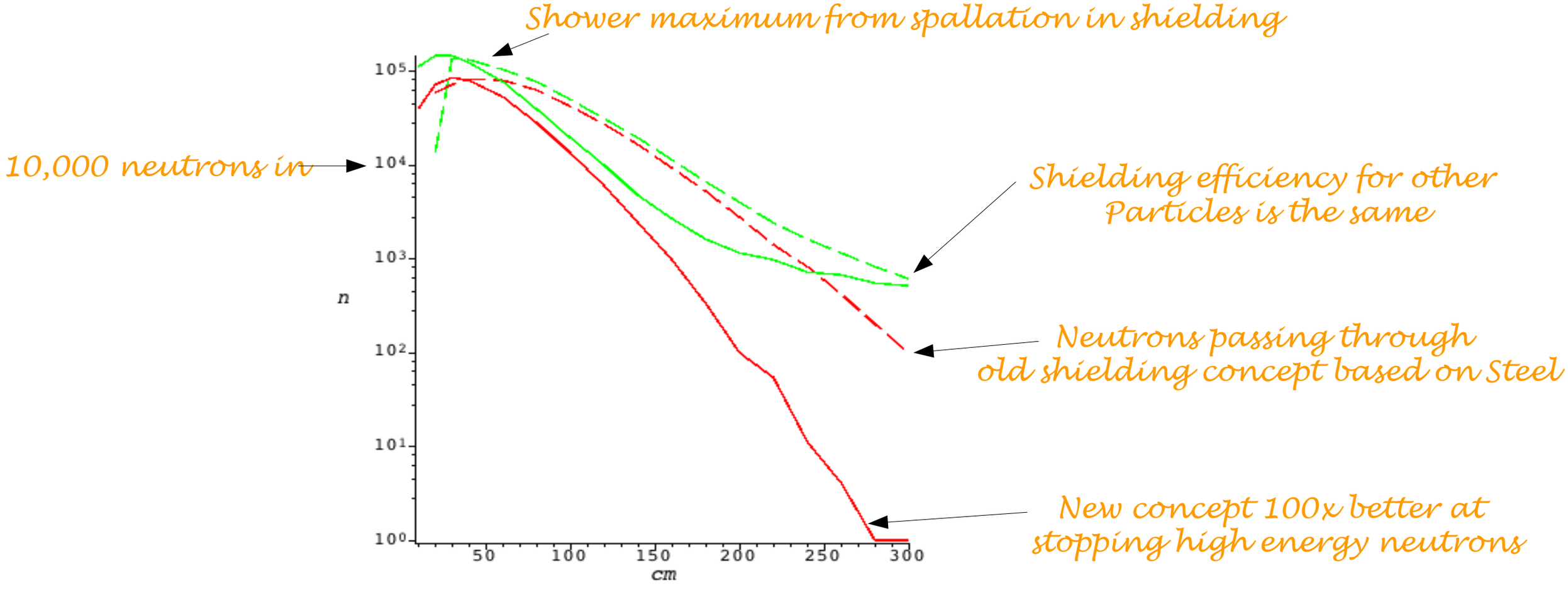


Copper Shielding

- Not necessarily in large volumes



Budgets Available

- Guides & shielding R&D is the largest item in the ESS neutron optics budget

- 3.7 M Euro

- 2 visits to USA per year until 2019

- 280 k Euro for materials

- 240 k Euro for detectors

Budget Breakdown

Neutron Optics Group