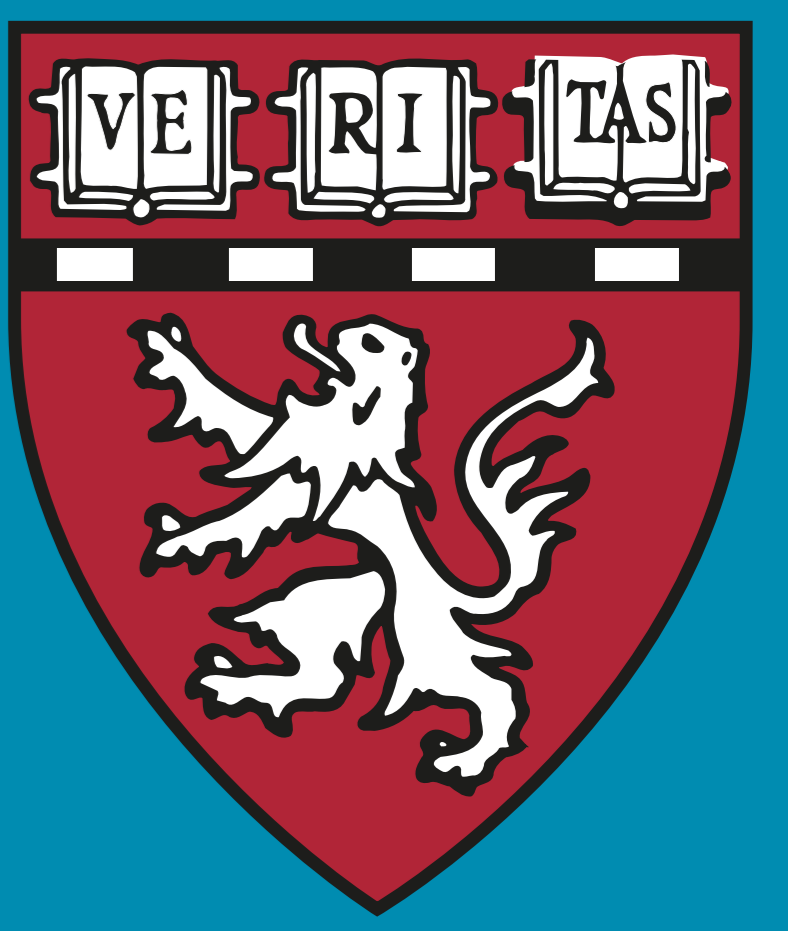




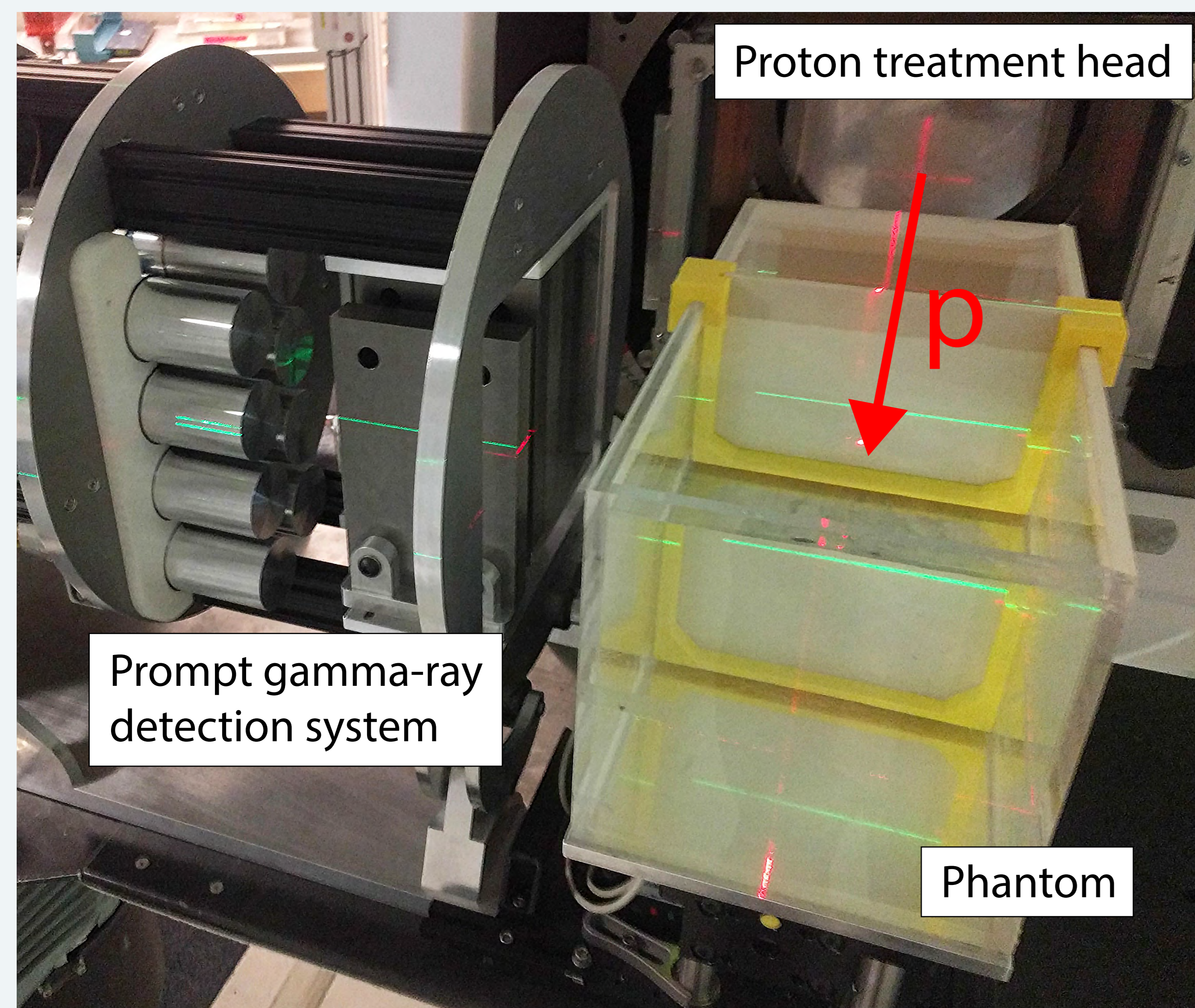
Proton range verification with submillimeter precision using a full-scale clinical prototype prompt γ -ray spectroscopy system



Joost Verburg

Imaging For Particle Therapy, Tuesday 7/31, 11:00 AM - 12:15 PM, Karl Dean Ballroom B1

New full-scale prototype system

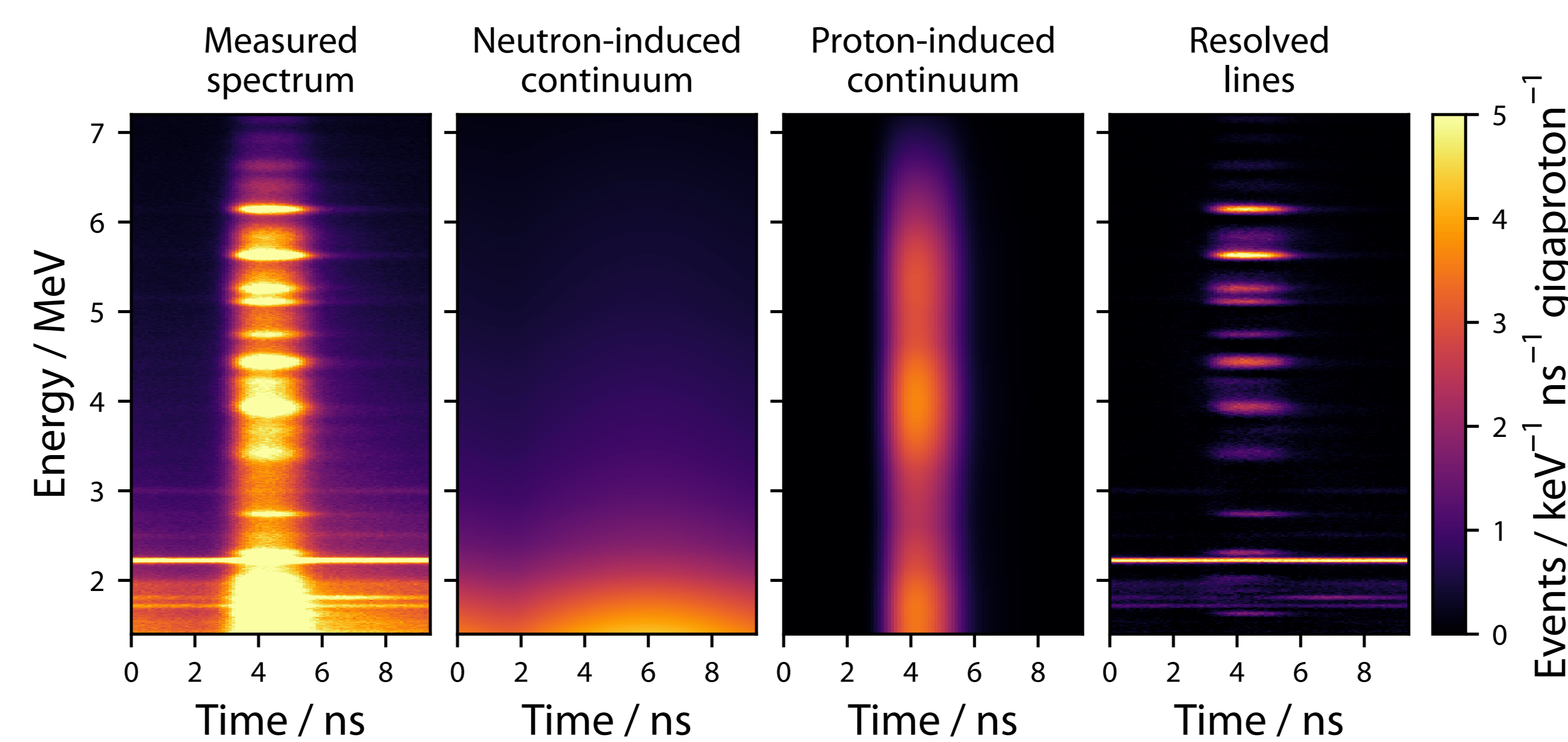


8 LaBr₃ detectors measure prompt γ -rays from proton-nuclear reactions near the end-of-range of proton pencil-beams.

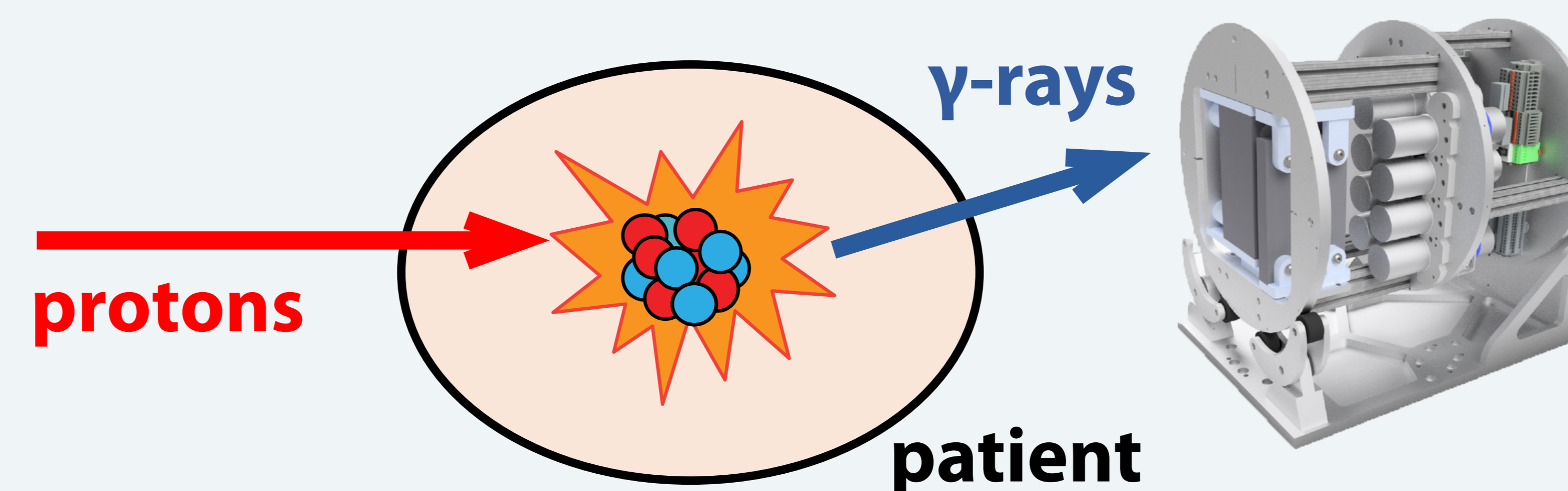
This experiment: Irradiating 10x10x10 cm³ target with 1 Gy dose at full beam current.

Measurement and comparison with treatment plan

The measured prompt γ -rays for each pencil-beam are separated to identify different nuclear reactions:

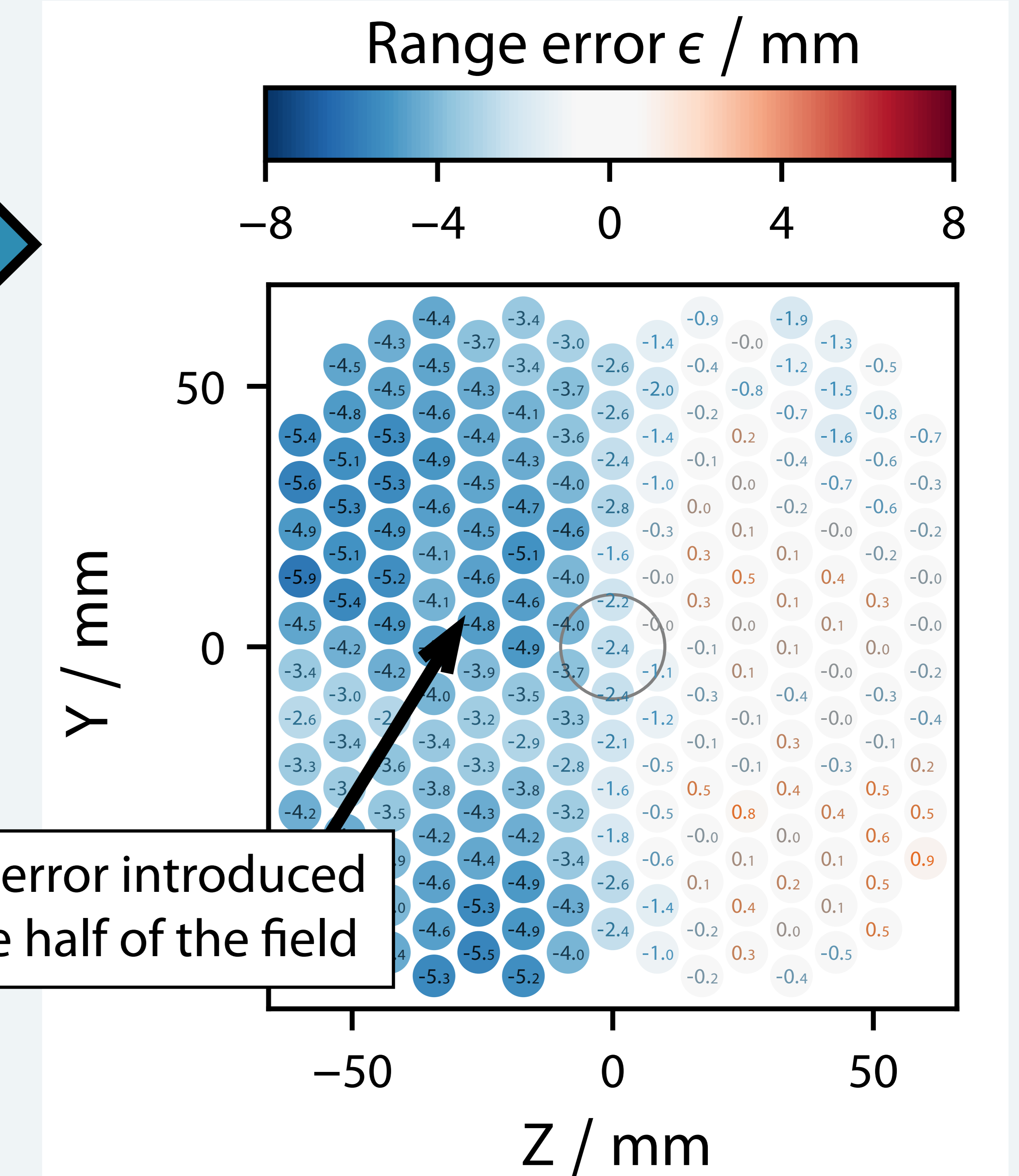


And compared with a model of the nuclear reactions and detectors, based on the treatment plan:



Pencil-beam range verification

Beam's eye view



Range error introduced on one half of the field

0.9 mm precision at 95% confidence with **1 Gy dose**