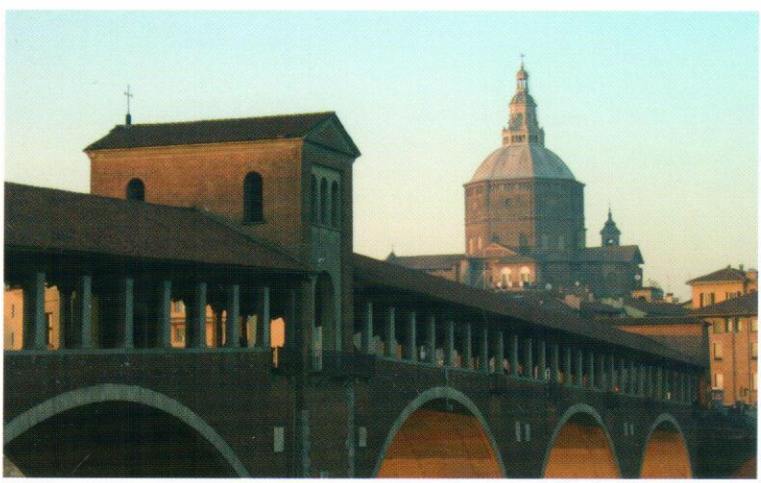
Europhysics Conference Abstracts

Volume 29F

Editors A. Fontana, G. Viesti, A. Zenoni

Europhysics Conference on New Trends in Nuclear Physics Applications and Technologies NPDC19 Pavia, Italy, September 5-9, 2005

Book of Abstracts



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Neutron producing target for accelerator based neutron capture therapy

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Pilot innovative accelerator based neutron source for neutron capture therapy of cancer [1] is under construction now at the Budker Institute of Nuclear Physics, Novosibirsk, Russia. One of the main elements of the cw facility is lithium target [2] producing neutrons via threshold $^{7}Li(p,n)^{7}Be$ reaction at 25 kW proton beam with energies 1.915 MeV or 2.5 MeV.

In the present report, choice of target was substantiated. The main problems of lithium target were determined to be: ^{7}Be radioactive isotope activation, keeping lithium layer solid, presence of photons resulted from proton inelastic scattering on lithium nuclei, and radiation blistering. The results of thermal testing of target prototype, investigation of radiation blistering and several simulations are presented. It becomes clear that water is preferable for cooling this target, and that the lithium target 10 cm in diameter is able to run up to 25 kW proton beam before melting.

The conception of optimal target is proposed: thin and easy to detach metal disk 10 cm in diameter, evaporated with thin layer of pure lithium from the side of proton beam exposure: its back is intensively cooled with turbulent water flow to maintain lithium layer solid. Design of target for the neutron source constructed at BINP is shown. Conceptions of radiation protection and neutrons, γ-rays and α-particles diagnostics are presented. The immediate plans on obtaining epithermal neutron beam are declared.

Possibility for the proton accelerator under construction to be used with energy lowered up to 1.75 MeV for monochromatic 9.17 MeV γ-quantum production on carbon-13 target for contraband detection is also discussed.

[1] B. Bayanov *et al.*, Nucl. Instr. and Meth. in Phys. Res. A **413** (1998) 397.
[2] B. Bayanov *et al.*, Applied Radiation and Isotopes **61** (2004) 817.