Neutrons for Therapy

Satellite Symposium to NEUDOS-11 at iThemba LABS, Cape Town,
Monday 12 October 2009

(кабинет директора iThemba LABS)

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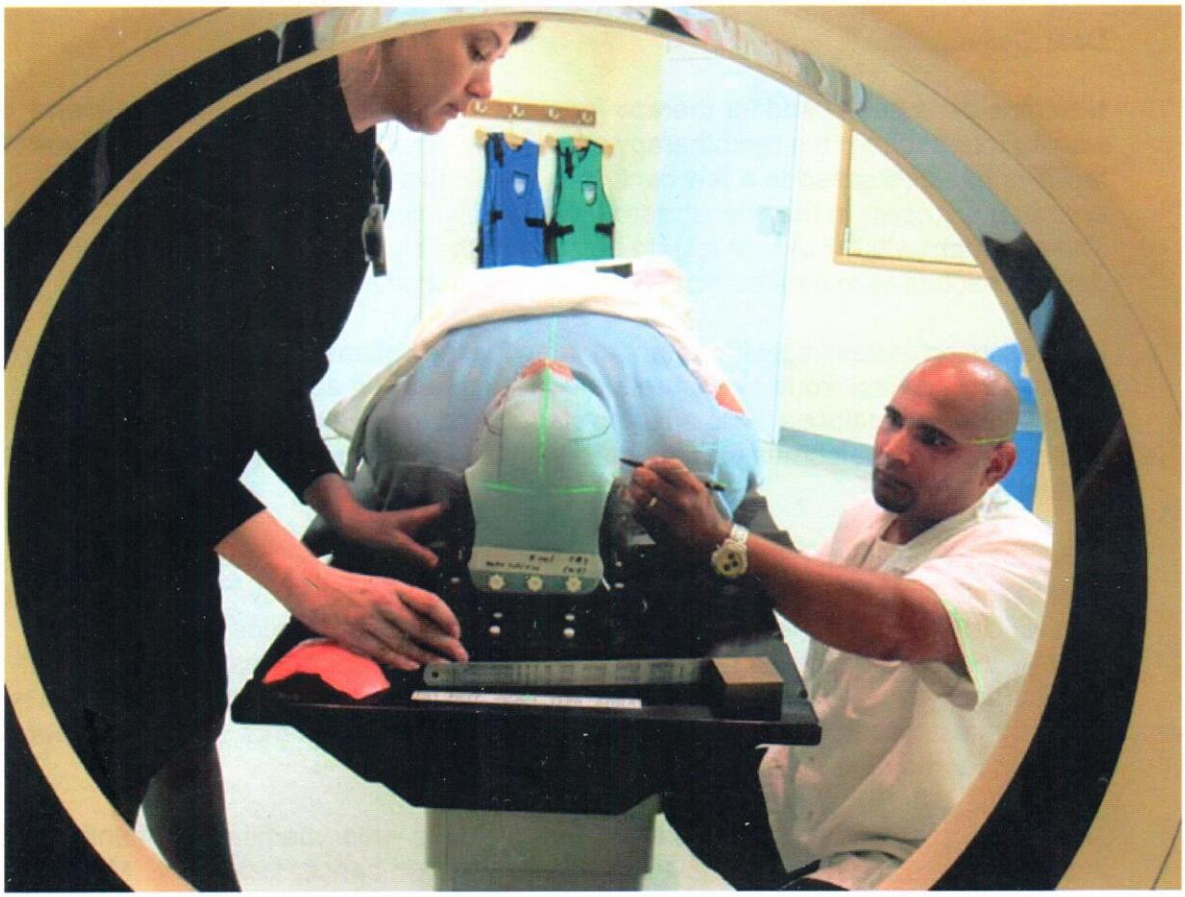

Programme and Abstracts

Acknowledgments

The organizers wish to thank the organizers of NEUDOS-11 for the opportunity to run this satellite symposium.
Special thanks also to the Cyclotron Trust for supporting the meeting and the International Science and Technology Center ISTC Moscow for its travel grant to Ms. Elyutina.

No technical problems for realization of best reaction to form the beam of epithermal neutrons for BNCT

S. Taskaev

Budker Institute of Nuclear Physics, Novosibirsk, Russia

It is world-recognized that the best reaction to form the beam of epithermal neutrons is ^{7}Li(*p*,*n*)^{7}Be reaction: neutron producing is high, and neutron spectrum is relatively soft [1]. This article describes the "best" epithermal neutron source created.

The tandem-accelerator with vacuum insulation was proposed and realized to product 1.915-2.5 MeV proton beam with current up to 10 mA. Moreover, the high energy stability and monochromaticity of proton beam was reached that enabled us to realize the near-threshold neutrons generation and did not require significant expenses for radiation safety.

While the ^{7}Li(p,n)^{7}Be reaction is excellent neutronically, the melting point of pure metal lithium is low, thermal conductivity is poor, and lithium is a very reactive metal, forming compounds immediately upon exposure to air. In spite of properties, all problems of lithium target were solved, namely i) the effective cooling was realized to keep lithium layer solid in order to prevent the propagation of ^{7}Be radioactive isotope, ii) the controlled evaporation of thin lithium layer was realized to reduce the accompanying gamma radiation, iii) materials for substrate were found as resistant to blistering as possible.

Now the facility is ready for neutron spectra measuring and for *in vitro* and in *vivo* investigations after modernization. We suppose there is no technical reason that a machine capable of generating the current needed to deliver therapy in reasonable times could not be built.

[1] T. Blue and J. Yanch. Accelerator-based epithermal neutron sources for boron neutron capture therapy of brain tumors. Journal of Neuro-Oncology 62 (2003) 19-31

Corresponding Author: Sergey Taskaev taskaev@inp.nsk.su