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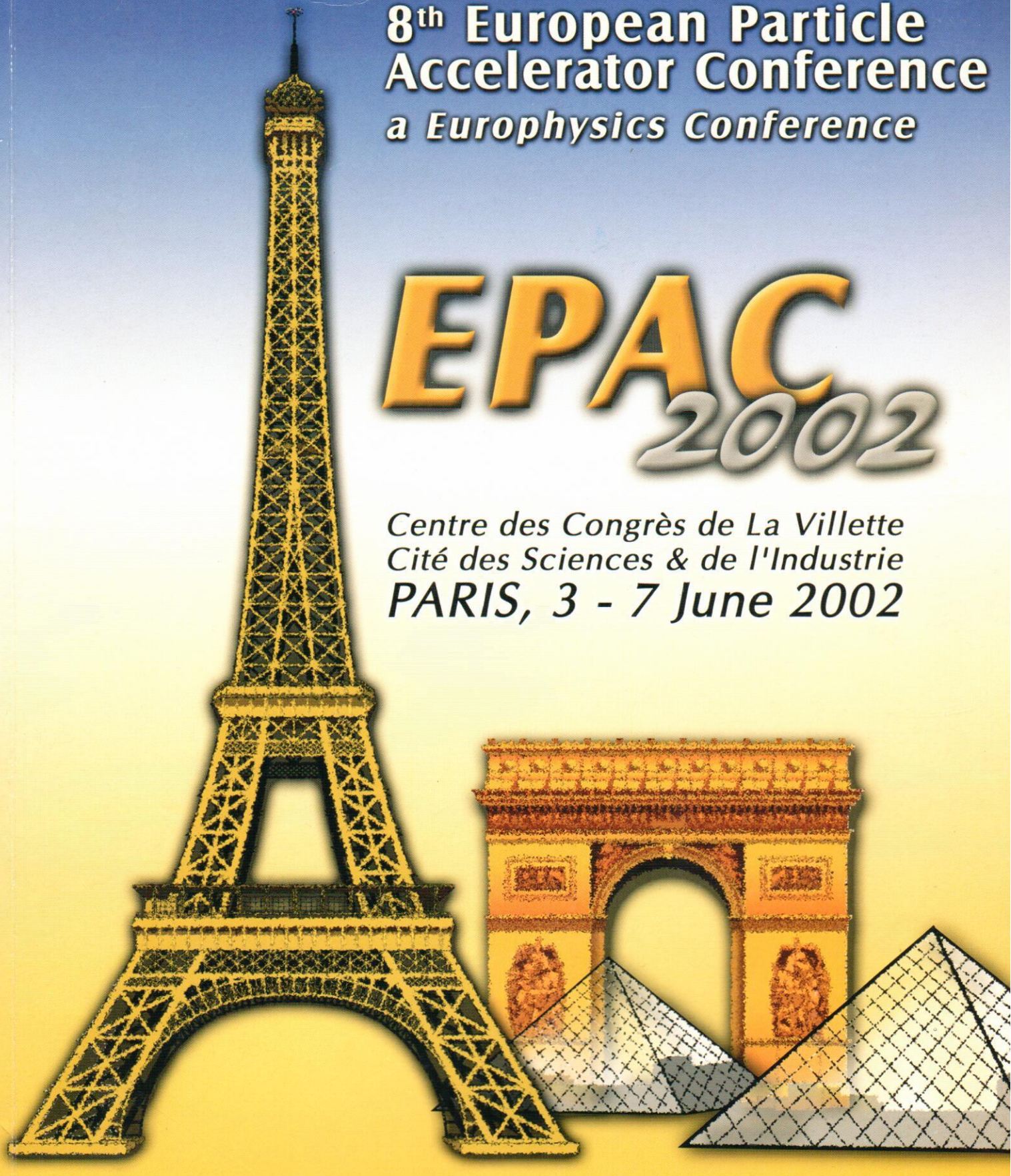

Abstracts Brochure

THPLE095

Separated Orbit Cyclotron with Magnet System Cooled by the Liquid Nitrogen, *I. Issinsky, A. Butenko, H. Khodzhibagiyan, O. Kozlov, B. Vasilishin, JINR, Dubna, Moscow Region* - Advantage of separated orbit cyclotrons, which efficiency of injection, acceleration and extraction are close to 100%, requires construction of compact bending and focusing magnetic systems using superconductivity. For reducing the expenses of both the accelerator manufacturing and operation a version of the SOC magnetic system cooled by the liquid nitrogen with using standard copper for windings is proposed. On the example of earlier developed superferric cyclotron is shown possibility of construction of such cryogenic systems at their advantage comparatively with use of liquid helium.

THPLE096

An Inverted Plasma Sheath for the Simulation of the Extraction of Volume Produced H-, *R. Becker, IAP, Frankfurt-am-Main* - For the extraction of positive ions from plasmas well established computer programs are available, which are based on the simple Bohm sheath theory. In general the results of such simulations agree very well with experimental data. The situation is completely different, however, for the simulation of the extraction of volume produced H- ions. No simple theory exists for the formation of an inverted sheath, connecting the quasi-neutral plasma in a self-consistent manner with the field provided by the positive extraction voltage. Based on a formulation of the space charge of the virtual cathode, caused by reflected protons in the extraction aperture, a linear model for an inverted plasma sheath will be presented, which allows to discuss the influence of most physical processes in the formation and extraction of H- and may become the basis of a correct simulation program.

THPLE097

High Current Tandem Accelerator for Intense Monochromatic Gamma Rays Generation, *A. Krivenko, L. Barkov, Y. Belchenko, G. Derevyankin, G. Dimov, G. Kraynov, R. Salimov, V. Shirokov, G. Silvestrov, I. Sorokin, S. Taskaev, M. Tyunov, BINP, Novosibirsk* - Original 2 MeV proton tandem accelerator with current up to 40 mA for monochromatic 9.17 MeV gamma-quantum production on Carbon-13 target for contraband detection is described. The tandem is supplied by a powerful sectioned rectifier from ELV type industrial accelerator providing high stability of the proton beam in the region of maximum gamma rays production at protons energy 1.76 MeV. The description of working ion source with current up to 10 mA, variants of gas stripper system and design of 100 kW Carbon-13 target with liquid metal cooling are presented. Also the results of optics calculation for focussing on stripper of high current (10-40 mA) compensated H(-) beam with heterogeneous density and transverse energy about 1 eV are given.

THPLE098

Development of Compact FFAG Accelerator for Heavy Ion Radiotherapy, *T. Misu, T. Fujisawa, T. Furukawa, S. Hojo, T. Honma, Y. Iwata, M. Kanazawa, A. Kitagawa, K. Kono, M. Kumada, N. Miyahara, T. Murakami, M. Muramatsu, K. Noda, Y. Sakamoto, Y. Sato, M. Suda, A. Sugiura, E. Takada, M. Torikoshi, S. Yamada, M. Yoshimoto, NIRS, Chiba City* - During the past several years of successful clinical trial at the Heavy Ion Medical Accelerator in Chiba (HIMAC), the heavy-ion accelerator has proven to be a powerful tool for cancer treatment. Due to our satisfactory clinical records at HIMAC, a medical Fixed-Field Alternating-Gradient (FFAG) accelerator, which is more compact and cost-effective, is being proposed so as to establish the medical standards for a carbon-beam cancer therapy. In this study we present our current accelerator design scheme.

THPLE099

S-ring Project at NIRS, *K. Noda, M. Kanazawa, T. Murakami, E. Takada, S. Yamada, NIRS, Chiba City; S. Shibuya, Sumitomo Heavy Industries, Tokyo* - The small ring (S-ring) project has been started since April, 2001 at NIRS for the following purposes: (1) Development of key-technologies for a compact heavy-ion synchrotron for the cancer therapy, (2) Study of the radical behavior in a living body, (3) Bio-physics experiment with high LET beam for the estimation of the radiation risk in space and (4) Accelerator physics. The S-ring will deliver heavy-ion beams with energies from 1 to 28 MeV/n, s bunch length of 10 to 1000 ns and a small emittance, while the circumference is as small as 25 m. The lattice structure of the ring is based on a double-bend achromatic structure. Applying a bunch rotation method to the high quality beam generated by an electron cooler, we will obtain a short bunched beam through a fast extraction method. An un-tuned RF cavity is adopted to accelerate the beams, which has been tested at a low-power level. A switching type power-supply has been developed as that for a main magnet has been developed, and its tracking accuracy and stability are estimated to be around 1e-4 and 1e-6 order, respectively. The design and R&D result will be presented.

THPLE100

Injection into RFQ Using Beams with Different Energies, *V. Kapin, K. Noda, NIRS, Chiba City* - An alternative way of beam injection into RFQ linac is discussed. In the low energy part of an ion accelerator, a monochromatic beam extracted from ion source is transported to the entrance of RFQ by the low energy beam transport system (LEBT). RFQ has a high current limit. A beam current is often limited by LEBT or an ion source. A possible way to increase the beam current is to combine several beams at the entrance of RFQ. Beams can be generated by a set of ion sources or a miltiple-beam ion source. A longitudinal acceptance of RFQ has a large energy spread (up to 30-40%), and can be filled by monochromatic beams with different energies. A total combined beam has a discrete energy spectrum within RFQ energy spread. Beams can be combined using a bending magnet acting as an inverse spectrometer. In the case of a linac with a short-pulse operation, a conventional long-pulse ion source can be used. An extracted long-pulse ion beam is cut to the set of short-pulse beams, which are stored on separated orbits of a supplementary ring. The injection scheme is studied for the HIMAC RFQ. Parameters of beam-line and simulation results are presented.