

**A Magnetic Scanning System for Proton Radiotherapy,** E. GRUSELL, Dept. of Hospital Physics, Uppsala University; B. GLIMELIUS, S. LORIN, J. MEDIN, N. TILLY, Dept. of Oncology, Uppsala University; M. BLOM, Dept. of Radiation Sciences, Uppsala University - Actively magnetic scanned proton beams yield dose distributions that in most cases are superior to other external radiation treatment modalities, and also to passively scattered proton beams (using metallic scattering foils). Such a scanning system is presently under development at the The Svedberg Laboratory (TSL) in Uppsala, Sweden. The chosen design, using a small polegap of the magnets (10 mm) and a moveable second magnet whose mechanical motion is synchronized with the magnetic deflection of the beam in the first magnet, yields a very compact scanning head which therefore can be incorporated in a gantry of relatively limited size. With the present design, spot scanning can not be used due to high mechanical accelerations of the second magnet causing mechanical stress in the bearings. Therefore the second magnet moves continuously during the scan. Positioning of the Bragg-peak in depth (range modulation) is performed with a number of Plexiglas slabs with varying thickness pushed into the beam by compressed air. This is done after the magnetic scan at each depth is finished. The technical design will be described in detail, together with the used scanning technique and preliminary results obtained in the 180 MeV proton beam at TSL.