Second Workshop on Particle Minibeam Therapy



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CNAO: a radiobiology and pre-clinical research facility with protons, carbon ions, and soon, helium

CNAO is one of the four centres in Europe, and six worldwide, offering treatment of tumours with both protons and carbon ions. Since its start in September 2011 almost 4500 patients have been treated. In addition to clinical activity, CNAO performs research as an institutional mission. In this framework a room dedicated to experimental activities is available and open also to external researchers willing to perform activities related to radiation biophysics, radiobiology, space research, materials research and detector development. The CNAO synchrotron provides energies up to 400 MeV/u for carbon ions (corresponding to a Bragg peak depth of 27 cm in water) and up to 227 MeV for protons (corresponding to a Bragg peak depth of 32 cm in water). The maximum proton energy available is 250 MeV. The minimum extraction energies are about 63 MeV and 115 MeV/u, for protons and carbon respectively, corresponding to a particle range of 30 mm. An additional ion source is under installation and additional ions (i.e. helium, oxygen, lithium, iron) will be made available in the experimental room within 2024. The beam distribution in the CNAO experimental room is based on the same active scanning system in use in the treatment rooms. Furthermore, access to biological laboratory with all the necessary equipment for cell preparation and handling is provided. In addition, in the next 2 years the research area will be expanded and areas dedicated to microscopy, cell handling, cytology/histology and small animals housing and preparation will be accessible. Nowadays, in vivo experiments with mice are possible thanks to the nearby animal house facility and the strong collaboration with the University of Pavia, after technical evaluation and approval by the local ethical committee.

Primary author: FACOETTI, Angelica (CNAO Centro di Adroterapia Oncologica)

Co-authors: CARNEVALE, Federica (CNAO Centro di Adroterapia Oncologica); CHARALAMPOPOULOU, Alexandra (CNAO Centro di Adroterapia Oncologica / Instituto Universitario di Studi Superiori (IUSS)); DONETTI, Marco (CNAO Centro di Adroterapia Oncologica); FELCINI, Enrico (CNAO Centro di Adroterapia Oncologica); FRISELLA, Guglielmo (CNAO Centro di Adroterapia Oncologica / Instituto Universitario di Studi Superiori (IUSS)); FULGINI, Giorgia (CNAO Centro di Adroterapia Oncologica); LEVA, Susanna (CNAO Centro di Adroterapia Oncologica / Instituto Universitario di Studi Superiori (IUSS)); MEREGHETTI, Alessio (CNAO Centro di Adroterapia Oncologica); PAVANELLO, Vittoria (CNAO Centro di Adroterapia Oncologica / Instituto Universitario di Studi Superiori (IUSS)); SAVAZZI, Simone (CNAO Centro di Adroterapia Oncologica); VOLPI, Gaia (CNAO Centro di Adroterapia Oncologica / Instituto Universitario di Studi Superiori (IUSS)); PULLIA, Marco (CNAO Centro di Adroterapia Oncologica); ROSSI, Sandro (CNAO Centro di Adroterapia Oncologica)

Presenter: FACOETTI, Angelica (CNAO Centro di Adroterapia Oncologica)

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