03.04.01 Applied Mathematics and Physics

Particle Accelerators for Medical Application

Particle accelerators are widely used in medicine. Medical e-linac (linac – linear accelerator) are used for the distant radiotherapy of the tumors. Linac provides the electrons or gamma quants delivery to tissues and organs. Proton accelerators (frequently cyclotrons) are used for the production of radio isotopes needed for positron emission tomography (PET) and single-photon emission computed tomography (SPECT).

MEPhI has been implementing radio diagnostics educational programs for many years already. The operation and the testing of high-tech complexes of radio and nuclear medicine demand well-trained specialists that have necessary competences. Such specialists should study many different courses as well as accelerators theory and engineering and main components of particle accelerators. They also should have expertise in contemporary trends in particle accelerators and have necessary practical and operational experience. The proposed Master's program was developed for future training of students that just finished base course and for specialists having few years of work in the field of medical accelerators and planning to continue the education. The main feature of this Master's program is the combination of accelerators engineering and medical physics. As an example, the module "Nuclear medicine" is included to the program to give students base knowledge about operation of accelerators in clinic. The Master's program includes theoretical part (lectures and seminars) and practical part that is conducted at MEPhI which has a number of operating accelerators. Practical training is done in cooperation with N.N. Blokhin Russian National Cancer Treatment Center located next to the MEPhI Moscow campus.