"P = mc2" - Physics in Medicine of CancerCare

Prof. Dr. Joao Seco

DKFZ und Fakultät für Physik und Astronomie, Heidelberg

Medical physics (also called **biomedical physics**, **medical biophysics** or **applied physics in medicine**) is, generally speaking, the application of physics concepts, theories and methods to medicine or healthcare. Medical physics departments may be found in hospitals or universities. There are 4 main areas of medical physics specialty 1) medical imaging physics, 2) radiation therapeutic physics, 3) nuclear medicine physics and 4) health physics, which cover more that 90% of all medical physics activities.

Radiation therapeutic physicists work primarily in radiation oncology hospital departments, which specialize in cancer care. Radiation therapy (RT) is the most common treatment for cancer, being used in approximately 70% of all cancers either alone or combined with surgery or chemotherapy. It uses high-energy particles or waves, such as x-rays, gamma rays, electron beams, protons, carbon ions, to "kill" or "damage" cancer cells. There is a growing interest in the use of ion-beams (protons, carbon ions) for cancer therapy. The principal benefit of ion-beams are there finite range (or depth) in tissue, known as Bragg peak, where a significant amount of the radiation is deposited at the end of the track where the ions stop. The talk focuses on providing an understanding of how particle beams are used to treat cancer.