Abstract

Whether for diagnosis or therapeutic purposes, X-rays have many applications in medicine. Synchrotron Radiation sources open new perspectives. This has already been the case for a number of years in molecular and cellular biology where the scope of absorption and diffraction work has been greatly extended. This could also be the case for medical imaging and radiotherapy where the characteristics of the beam (collimation, stability, flux) allow new approaches in the energy range of radiological X-rays. Such a source is built today in Jordan; known as SESAME synchrotron facility. The design of the SESAME light source is based on an electron storage ring with maximum energy of 2.5 GeV and a beam current of 400 mA. A beamline dedicated to medical imaging and therapy is proposed to be built at SESAME facility. This beamline will cover medical imaging (angiography, tomodensitometry, microtomography, X-ray microscopy) as well as radiotherapy. One of the most important factors for the design is the high photon flux required for the various medical applications. This can be achieved through the combination of the storage ring and a superconducting multipole wiggler. Special windows and apertures, mirrors and monochromators are also required to produce beam with high cross-sectional uniformity. This talk includes a description of the design features of the beamline as well as the insertion device. Some applications that can be performed at this beamline will be discussed. Experimental techniques proposed to be used in these applications will be also introduced in more detail and some recent results will be presented. Moreover the talk will show the efforts done by the Jordanian Association of the Medical Physics (JAMP) and the Jordanian medical physicists to support building-up this beamline. All the aforementioned points make clear that the medical Imaging and therapy beamline at SESAME synchrotron facility will be of great use to the medical sciences and will lead to valuable advances in medical imaging and therapy technologies. Furthermore the beamline will give a major boost to Jordanian's medical physics science community.