



## **MEDICAL APPLICATIONS PROTONS AND BORON, A POSSIBLE ALLIANCE IN THERAPY**

There are positive results from experiments on cells using boron in proton therapy. The experiments, which were conducted by an international team of Italian and Czech researchers, seem to demonstrate for the first time that a reaction from a fusion of proton and boron 11 ( $^{11}\text{B}$ ) can be effectively achieved in cancerous cells. This result would make the reaction potentially useful for the treatment of tumours with proton therapy, by increasing the biological efficacy of the “shells” (the protons) used to “bombard” and destroy the tumour cells. The experimental method, called Proton Boron Capture Therapy (PBCT), involves administering molecules containing nuclei of  $^{11}\text{B}$  inside the tumour mass, which is then bombarded with a proton beam. The latter interacts with the nuclei of  $^{11}\text{B}$  giving a very high probability of producing three low energy alpha particles (around 4 MeV). These three alpha particles that are emitted stop immediately and release all of their energy inside the single cell, causing enormous biological damage to add to that generated by the proton incidence. The presence of the substance containing the  $^{11}\text{B}$  nuclei in the tumour cells has been shown to increase by up to 30% the biological efficacy of cell deaths. The research is based on irradiating various tumour cells in differing conditions over the course of two years of intense experimental activity, carried out in the Southern National Laboratories (LNS) of INFN. ■