Contribution ID: 30

Development of Intraoperative Beta Probes based on Silicon Photomultipliers

Wednesday 13 June 2012 12:15 (1h 45m)

Intraoperative localization of malignant tissues labeled with positron radiotracers opens up new prospects to improve the efficiency of cancer surgery. Because Silicon Photomultipliers (SiPM) introduced a breakthrough for the development of miniaturized imaging devices, we are currently designing two intraoperative beta probes based on this technology: a light imaging device with a small field of view (~5cm2) to perform tumor localization and post-operative control of the surgical cavity, and a miniaturized counting probe to guide in real time the excision of the tumor lesion. The first step of our project was focused on the characterization and optimization of SiPM devices as photodetectors for intraoperative beta detection. We studied the influence of temperature and bias voltage on the thermal and correlated noises and photon detection efficiency of different SiPM devices. The impact of these two parameters on the overall beta sensitivity was quantified as a function of the intensity of the scintillation light following a simple physical model. According to the results of this comprehensive study, the optimization of the detection head design of the two intraoperative probes was studied using Monte Carlo simulations. Detailed description of the simulation study as well as the performance characterization of the first prototypes will be presented at the conference.

Authors: Dr MENARD, Laurent (Laboratoire IMNC); Mr HUDIN, Nicolas (Laboratoire IMNC)

Co-authors: Mr JANVIER, Batiste (Laboratoire IMNC); Mr BENOIT, Didier (Laboratoire IMNC); Dr PINOT, Laurent (Laboratoire IMNC); Dr DUVAL, Marie-Alix (Laboratoire IMNC); Dr DINU, Nicoleta (LAL); Mr AIT IMANDO, Taïbi (LAL); Dr PUILL, Véronique (LAL); Prof. CHARON, Yves (Laboratoire IMNC)

Presenter: Mr HUDIN, Nicolas (Laboratoire IMNC)

Session Classification: Posters A