PhD fellowship on dual-energy cone-beam CT

The CREATIS laboratory (`http://www.creatis.insa-lyon.fr/`, Lyon, France) opens a PhD fellowship on the topic of dual-energy cone-beam computed tomography (CT). The position is part of the DEXTER project funded by the *Agence Nationale de la Recherche*.

Scientific context

The DEXTER project is a collaboration between radART (`http://www.open-radart.org`, Salzburg, Austria) and CREATIS around a new patient alignment system with an integrated x-ray imaging ring (PAIR) developed for image-guided radiotherapy (IGRT). PAIR is developped in Salzburg by a spin-off company of the Paracelsus Medical University, medPhoton. The first prototype is available for research purposes and it will also be installed at MedAustron, the new Austrian center for ion beam therapy.

Among other characteristics, PAIR has an x-ray tube that covers a large range of rapidly switchable energies from 40 kV to 120 kV along with remotely exchangable filters. This enables multi-energy CT which finds applications in the characterization of tissues for ion therapy. Ion therapy is currently planned on a mono-energy CT which requires an additional margin of about 3% of the ion range. Dual energy could allow the reduction of this uncertainty.

Objective

The purpose of this PhD is to estimate the range of ions in patient prior to hadron therapy using dual-energy cone-beam CT.

Research program

The PhD fellow will join the research group of CREATIS at the Léon Bérard cancer center. This group has several years of research experience in x-ray simulation and imaging / planning for hadron therapy. The following program is currently planned:

- Model PAIR in Monte Carlo simulations,
- Investigate acquisition protocols for the characterization of tissues with two energies,
- Evaluate the protocols on phantoms in Salzburg,
- Investigate other applications of dual-energy cone-beam CT in IGRT.

Profile

- **Education**: The candidate must hold a master in image processing, medical physics or particle physics.
- **Scientific interests**: computer sciences (medical image processing), x-ray and particle physics, Monte Carlo simulations.
- **Programming skills**: C++.
- **Languages**: English required, French optional.
- **Location**: Centre Léon Bérard, Lyon, France.
- **Salary (gross)**: 1757 euros/month.
- **Period**: 3 years starting march 2014.

Contacts

Send CV and a brief statement of interest by email to Simon Rit: simon.rit@creatis.insa-lyon.fr.