Postdoctoral fellowship

Radiative transfer modelling using Monte-Carlo methods: towards a better understanding of light-matter interaction in diffusive medium

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The project

An accurate knowledge of light distribution in natural optically diffusive media is essential to a better understanding of how light affects our environment and helps us decipher it. Despite years of research, light propagation models in diffusive media often rely on approximations. Therefore, the heterogeneity of these media cannot be entirely taken into account. Since these approximations primarily come from a lack of knowledge about the physical structure of the propagation media we propose a strategy aiming at (1) collecting data on internal physical structure of ice cap and various biological tissues using innovating imaging techniques and X-rays (2) improving existing models with measured structural parameters, and (3) developing efficient modelling strategies to reproduce light propagation in various diffusive media. The new developed models of light propagation will permit us to gather precious information, especially regarding the impact of climate changes on marine ecosystems in the Arctic. They will also enable the development of new affordable and easy to use diagnosis devices to identify health issues specific to the remote Northern populations such as dermatological problems and issues with circadian rhythm.

The Sentinel North Program

Sentinel North is an unprecedented transdisciplinary strategy encouraging the creation of joint teams and projects in line with discovery, transdisciplinary, innovation, collaboration, partnership and technological transfer. Sentinel North also aims at encouraging the development of the next generation of scientists to tackle complex problems of the changing North. Students and postdoctoral fellows involved in the program will benefit from a dynamic learning community revolving around the rich sharing of knowledge.

The Candidate

We are looking for a postdoctoral fellow with expertise in numerical modelling of physical phenomena, more specifically with the use of Monte-Carlo methods. The ideal candidate will have a PhD in physics or in a similar field, and will have scientific and technical expertise in numerical modelling. He/she needs to have advanced knowledge in programming (C/C++, OpenCL and/or CUDA) since he/she will actively participate in the development of an accelerated Monte-Carlo calculation engine using GPU. In addition, the ideal candidate will have exhibited above the average scientific productivity and strong skills for transdisciplinary team work.

Interested candidates should send their application to lrnp-pnrl@cervo.ulaval.ca