



PHYSICS AND ASTRONOMY COLLOQUIUM

Dr. Thomas Planche

TRIUMF

“The Cow is not Spherical: Space Charge in TRIUMF Accelerators”

Abstract

Accelerator physicists deal with electromagnetic fields ruled by Maxwell's equations. These fields act on charged particles through the Lorentz force. There should be no mystery at all, only good old nineteenth-century physics with its amazing simplicity, its sharp accuracy. We may throw in a little bit of special relativity here and there, because particle accelerators often bring their projectiles close to the speed of light. But here again: only simplicity and accuracy.

So why should it be a struggle to increase the beam current out of TRIUMF cyclotron? And why should an electron linac running from a photo-gun be such a challenge? Are these only technological limitations? Or is there something truly complex out there, a complexity emerging from the interaction of a multitude of simple systems?

In this colloquium I will talk about how charged particles when packed tight together give rise to surprising phenomena: that is what we call “space-charge effects” in the accelerator physics lingo. I will use a few examples taken from TRIUMF accelerators to illustrate, how strongly non-linear behaviours emerge from purely linear forces; how chaotic storm-like structures appear in our cyclotron, etc.

Friday, April 6, 2018

11:30 a.m.

ECS Building - Room 124