BAARTMAN, Richard A.

Most Significant Research Contributions of last 6 years.

Employment History

2005-present	Head, Accelerator Physics group, TRIUMF

Awards, Committees, Service to the community

2006-2009	Member, Editorial Board, Physical Review Special Topics - Accelerators and Beams
2008	Convener, Beam Dynamics session, HB2008
2008-2009	Program Committee PAC09 (BDEMF session chair)
2009-2012	Vice-Chair, Publications Committee of the Division of Physics of Beams, APS
2009-	Member, Int. Collaboration on Future Accelerators (ICFA) Beam Dynamics Panel
2009	Award: Fellow, American Physical Society
2009	Invited talk, DESIR High Resolution Separator Workshop
2010	Invited talk, Daedalus Workshop on MegaWatt Cyclotrons, MIT
2011	Award: Outstanding Referee, American Physical Society
2011	Appointment to Program Committee Chair, Int. Cyclotron Conference 2013

Member of team designing a megawatt-class electron accelerator. [6, 13, 15, 16, 25, 5] Oversee beam dynamics issues, and have contributed personally to the theory of electron envelopes from rest[3], the optics layout of the low energy section, and quadrupole design[4]. As a result of this work, have devised a new method of calculating optimal pole shapes of standard charged particle focusing elements (quadrupoles)[1]. Used this method to design the 77 quadrupoles for the transport of electrons from the ARIEL electron linac to the targets.

Developed a new technique for matching to cyclotrons[12, 11]. The technique used is to calculate the 3D beam envelopes (6 phase space dimensions) including space charge, axial magnetic field, and acceleration at the dee gaps in the cyclotron. The calculation is first order, but contains all the relevant physics of that order: in the cyclotron it includes electric focusing, the gap-crossing resonance, and the radial-longitudinal coupling (vortex) effect of space charge.

Used this technique to design a new vertical section of the beam line between the ion source and matching to the cyclotron. This line is 12 m in length and contains 26 quadrupoles. It has been installed, commissioned, and performs in agreement with theory.[2]

Designed and commissioned new beam lines for the electron cyclotron resonance (ECR) charge state booster[8, 10, 19, 29], the TITAN mass measurement experiment[30], the ISAC-2 experimental hall (MAYA, TUDA, TIGRESS experiments)[33, 26].

Developed and implemented a tomography technique to reconstruct 2-dimensional current density from 1-dimensional projections.[7, 28, 18]

Developed new differential algebra mathematical tools for particle beam optics.[20, 24]

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