

Licensable Technologies

Phase And Radial Motion in Electron Linear Accelerators (PARMELA), Version 3.0

Applications:

- Design and Simulation of FELs
- Commercial Linear Accelerator (Linac) Applications:
 - Medical Linacs
 - Food Sterilization
 - Ion Implanters
- Photoinjectors
- Beamlines / Transport Systems
- High-Intensity Electron and Ion Linacs

Benefits:

- Beamlines can be designed or optimized for low beam emittance or other relevant properties
- All component and particle properties can be described analytically or by import from external sources. E.g. distributions can be from measurements or other design codes, rf-fields or static fields can be from Superfish or Poisson, also distributed by LANL, or from other 2D/3D EM codes
- Graphical User Interface (GUI)-input to select data of interest is provided in some cases

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"Many modern electron linear accelerators were designed using PARMELA."

Summary:

Phase And Radial Motion in Electron Linear Accelerators (PARMELA) is a versatile code that transforms the beam, represented by a collection of particles, through a user-specified linear accelerator (linac) and/or transport system. It includes several space-charge calculation methods. Particle trajectories are determined by numerical integration through the fields. This approach is particularly important for electrons where some of the approximations used by other codes (e.g. the "drift-kick" method commonly used for low-energy protons) would not hold.

PARMELA works equally well for either electrons or ions at all velocities. PARMELA can read field distributions generated by the Poisson/Superfish group of codes, which are also distributed through Los Alamos National Laboratory (LANL). Many modern electron linacs were designed using PARMELA. Members of the PARMELA code group won a LANL Distinguished Copyright Award for the code.

Development Stage:

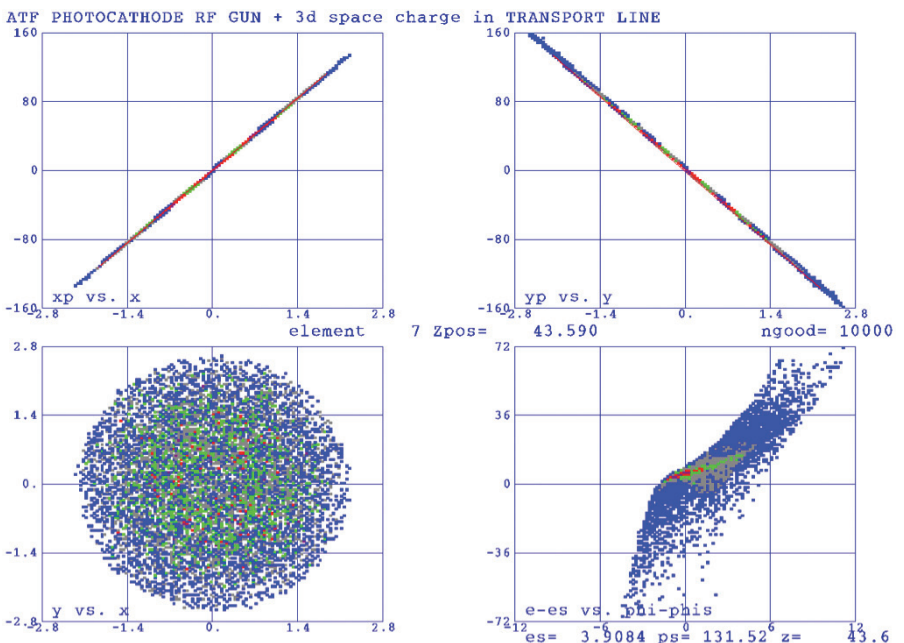
General distribution; PARMELA is a mature, globally-distributed code.

Patent Status:

Multiple copyrights

Licensing Status:

Available for non-exclusive licensing



Space and phase-space information on the transported particles can be obtained after each beamline element. Here the transverse dimensions (lower left), the transverse phase-space (upper plots) and the longitudinal phase-space (lower right) in a generic beamline are given.