

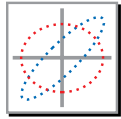
# AccelOrator



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The Newsletter for Particle Beam Optics Software

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## PBO Lab™ 3.1 Shipping Now!

The Next Generation of Charged Particle Optics Software

### ■ PBO Lab 3.1 Basic Package - New Capabilities:

- **PBO-Lab Preference option to Include Dispersion and Longitudinal Dynamics in the Focusing Tool Envelopes (1).**
- **Dispersion can be turned on or off using the Include Dispersion and Longitudinal Dynamics check box (2)**

- **Magnetic rigidity B-rho(T-m) added as a new "smart unit" selection option for the Beam Energy (3)**
- **PBO Lab 3.1 also includes Focusing and Bending Tool support for the Prism Piece (electrostatic deflector) as well as many other features not illustrated here.**

The screenshot displays the PBO Lab 3.1 interface with several key features highlighted:

- PBO-Lab Preferences (1):** The 'Focusing & Bending' tab is active, showing the 'Include Dispersion and Longitudinal Dynamics' checkbox (2) checked.
- Simulation Parameters (3):** The 'Tracing/Tracking' panel shows parameters such as Particle Charge (1.000000 e), Particle Mass (0.510999 MeV), Beam Energy (4.787348 B-rho(T-m)), and Beam Current (0.000000 mAmp).
- Beam Optics Diagrams:** The 'Transverse Projections of a' window shows beam envelopes for different elements (part, arc, cvty, arc, arc) with dispersion curves overlaid. The 'Beam Cross Section' window shows phase space ellipses.
- Menu:** The 'Focusing (2)' menu is open, showing options like Bending, Plot, Data Interchange, Function Integration, Numerical Integration, and Data Tools.

Annotations (1), (2), and (3) point to the preference checkbox, the simulation parameters, and the menu, respectively.

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### PMQ Piece Support added to TRANSPORT Module

Element	Fringe Field	Geometry	Location	
<b>Parameters</b>				
S Physical Length	37.000000	mm	2.5000	62.2732
S Max Magnetic Field Gradient	130.000000	T/m	-169.6000	169.6000
S Inner Radius	10.000000	mm	1.0000	49.0000
S Outer Radius	50.000000	mm	11.0000	100.0000
S Length with Fringe Fields	0.087000	m	0.0025	0.2623
<b>Equivalent Hard Edge Quad Parameters:</b>				
Hard Edge Effective Length	0.037418	m	0.0025	0.0626
Hard Edge Field Gradient	128.549004	T/m	-169.6000	169.6000

Comments:  
PMQ - PBO Lab 3.1 TRANSPORT Module includes support for the PMQ Piece

- The Permanent Magnet Quadrupole (PMQ) Piece is an optics element originally developed for the TRACE 3-D and MARYLIE Modules which includes fringe fields.
- New Equivalent Hard Edge Quad Parameters added to PMQ Piece for modeling with TRANSPORT Module:
  - Hard Edge Effective Length
  - Hard Edge Field Gradient
- New Equivalent Hard Edge Quad Parameters computed from data input on Fringe Field tab page
- Equivalent Hard Edge Quad Parameters together with the Physical Length parameter used to define equivalent length quadrupole for TRANSPORT modeling.



### New TRACE 3-D Module Options added for Adjacent Element Fringe Field Superposition in ElectroStatic (ES) Palette Module

- TRACE 3-D Elements tab Option for excluding (1) or including (2) overlapping electrostatic fields of adjacent Einzel1, Einzel2 & AccTube Pieces.
- Another new option (3) can be used to assign different Fringe Field Extension Factors for ES and PMQ Pieces.

**Trace 3-D Elements**

Graphic Scaling Parameters: Elements

Use Distinct ES & PMQ Fringe Field Extension Factors - Close & reopen this

Permanent Magnet Quadrupole Elements

PMQ Maximum Step Size: 2.500000 mm

Fringe Field Extension Factor (3): 2.500000

Thin Lens Element

Chromatic Aberrations: include

Aperture Elements

Aperture Piece Cuts: none (1)

ElectroStatic (ES) Elements

Superimpose Adjacent ES Fields: include (2)

ES Fringe Field Extension Factor (3): 1.000000

Graph Beam Line Command results with Superimpose Adjacent ES Fields Option set to none (1), followed by a Trace on Background Command with that Option set to include (2).

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