Particle and Ray Tracing Codes (PARMILA & TURTLE Introduction)

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Presentation Outline

Particle & Ray Tracing Codes

1. **Beam Dynamics Codes Used in LINAC Design**
2. **Introduction to TURTLE**
3. **Introduction to PARMILA - For Simulation of Transfer Lines**
   ⇒ **Other Applications of PARMILA Later in Course**
4. **Space Charge Modeling in PARMILA**
5. **Using PARMILA & TURTLE to Study Some Beamlines** ⇐
   ⇒ **You will use the Simulation Lab computers in the classroom**

5. Using PARMILA & TURTLE to Study Some Beamlines

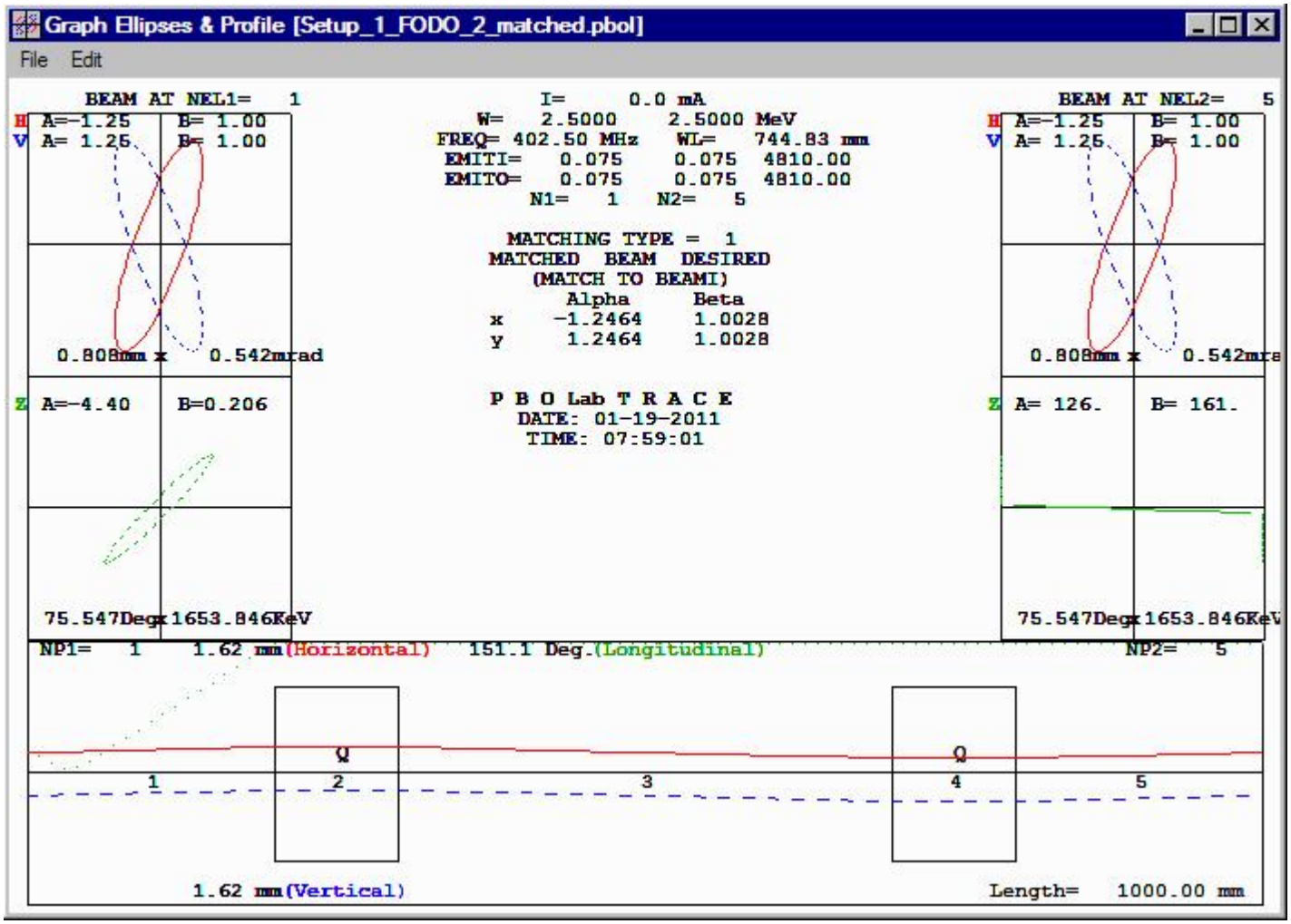
⇒ **Use the Simulation Lab computers in the classroom**

- **Compare PARMILA & TRACE 3-D at Low (~0) Current**
- **Explore the use of Lingraf to display data**
- **Compare PARMILA & TURTLE at Low (~0) Current**
- **Use PARMILA to Study High Current Transport**
- **Compare SCHEFF & PICNIC Space Charge Calculations**
- **Compare PARMILA & TRACE 3-D at High Current**

5. Using PARMILA & TURTLE to Study Some Beamlines

1. Open the Model "Setup_1_FODO_2_Matched" (or the Model "Setup_2_FODO_2_Fitted")

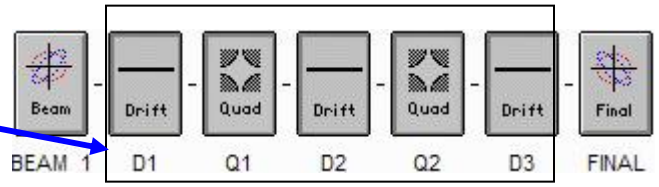
Use TRACE 3-D Command "Graph Beam Line"



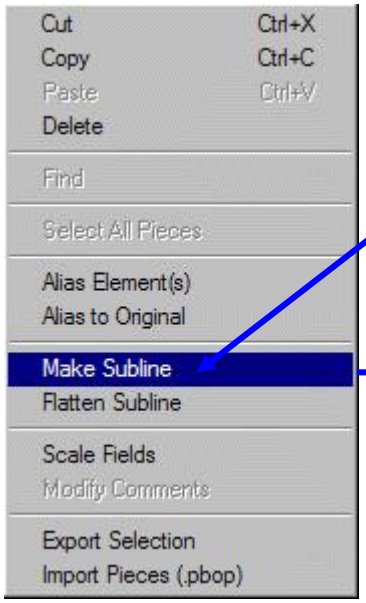
5. Using PARMILA & TURTLE to Study Some Beamlines (con't)

2. Create a Cell Subline

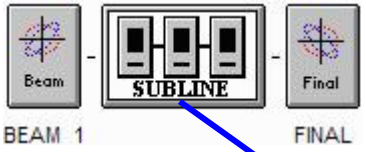
Select (Highlight) Pieces D1 through D3:



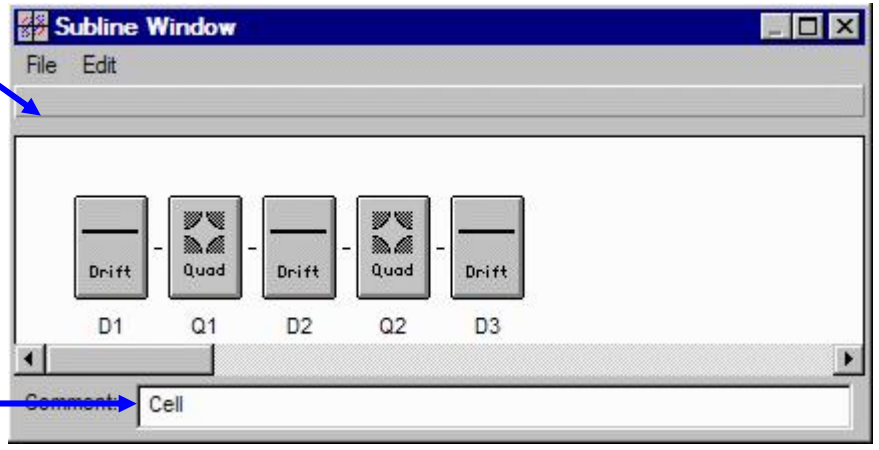
Use View Menu to "Make Subline"



Use View Menu to "Make Subline":



Open (Double Click) Subline

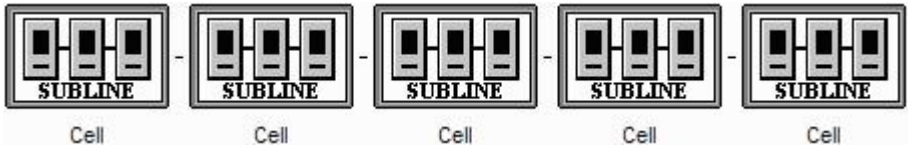


Type "Cell" into the Comment

5. Using PARMILA & TURTLE to Study Some Beamlines (con't)

Save the Model as "Setup_1_FODO_2_Matched_Cell"

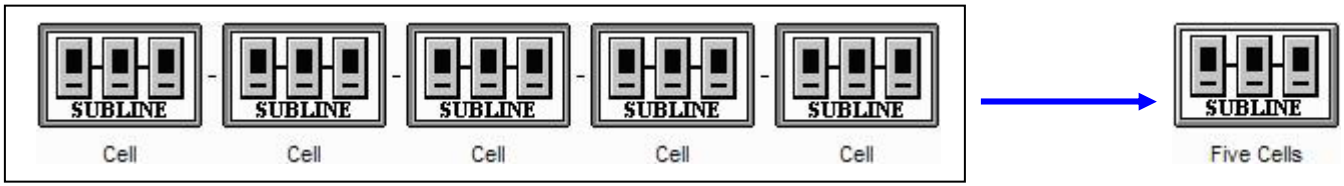
3. Build a 5 Cell Lattice - Add 4 Copies of "Cell" to the Beamline



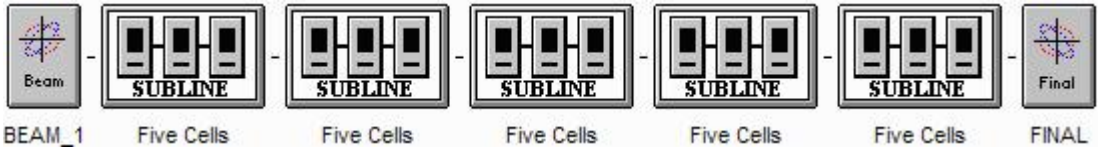
Save the Model as "Setup_1_FODO_2_Matched_Five_Cell"

4. Build a 25 Cell Lattice

- Create a "Five Cell" Subline



Your 25 Cell Model Should Look Something Like This:



Save the Model as "Setup_1_FODO_2_Matched_25_Cell"

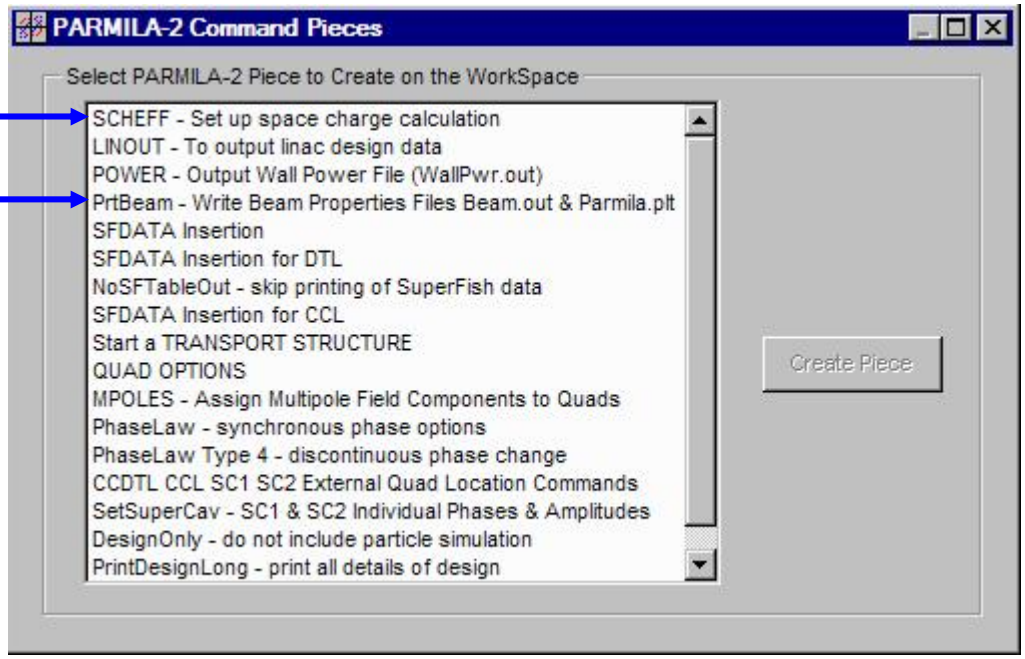
5. Using PARMILA & TURTLE to Study Some Beamlines (con't)

Use TRACE 3-D Command "Graph Beam Line"

Is the Beam Still Well-Matched Through 25 Cells?

5. Add 2 PARMILA Commands

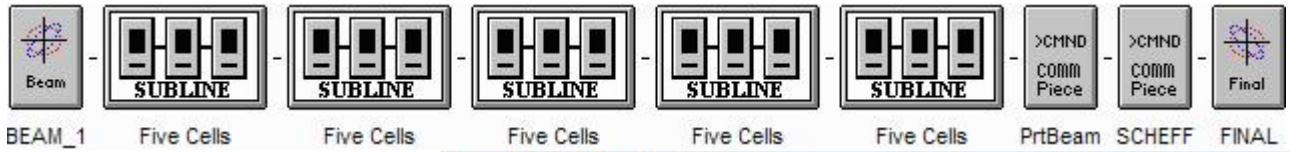
SCHEFF
PrtBeam



Place the PrtBeam and SCHEFF elements at end of beamline
- PrtBeam First, SCHEFF Following - (default parameters)

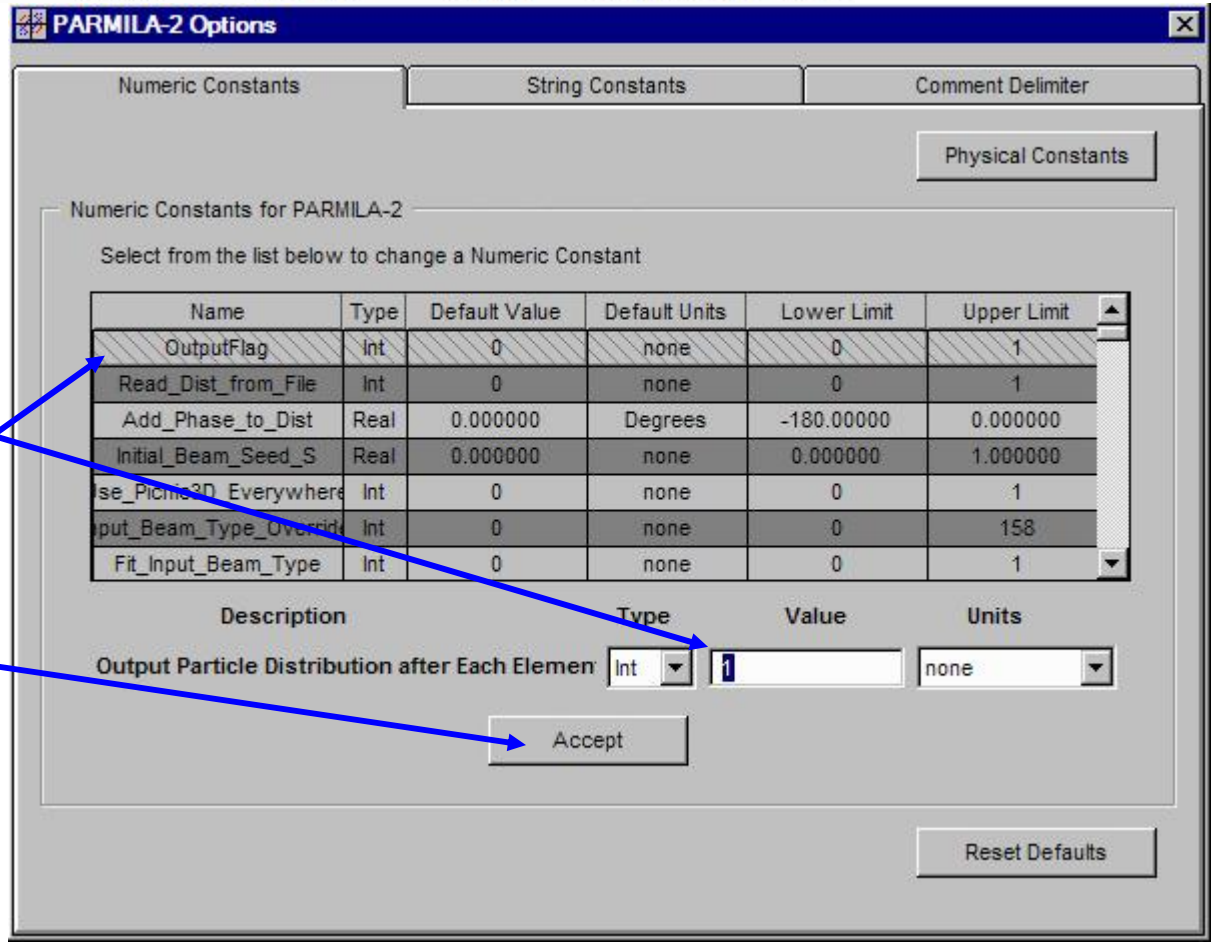
5. Using PARMILA & TURTLE to Study Some Beamlines (con't)

Model Should Look Something Like This:



Set the PARMILA-2 Option "OutputFlag" to "1":

Set Accept



Save the Model as:

"Setup_1_FODO_2_Matched_25_Cell_Parmila"

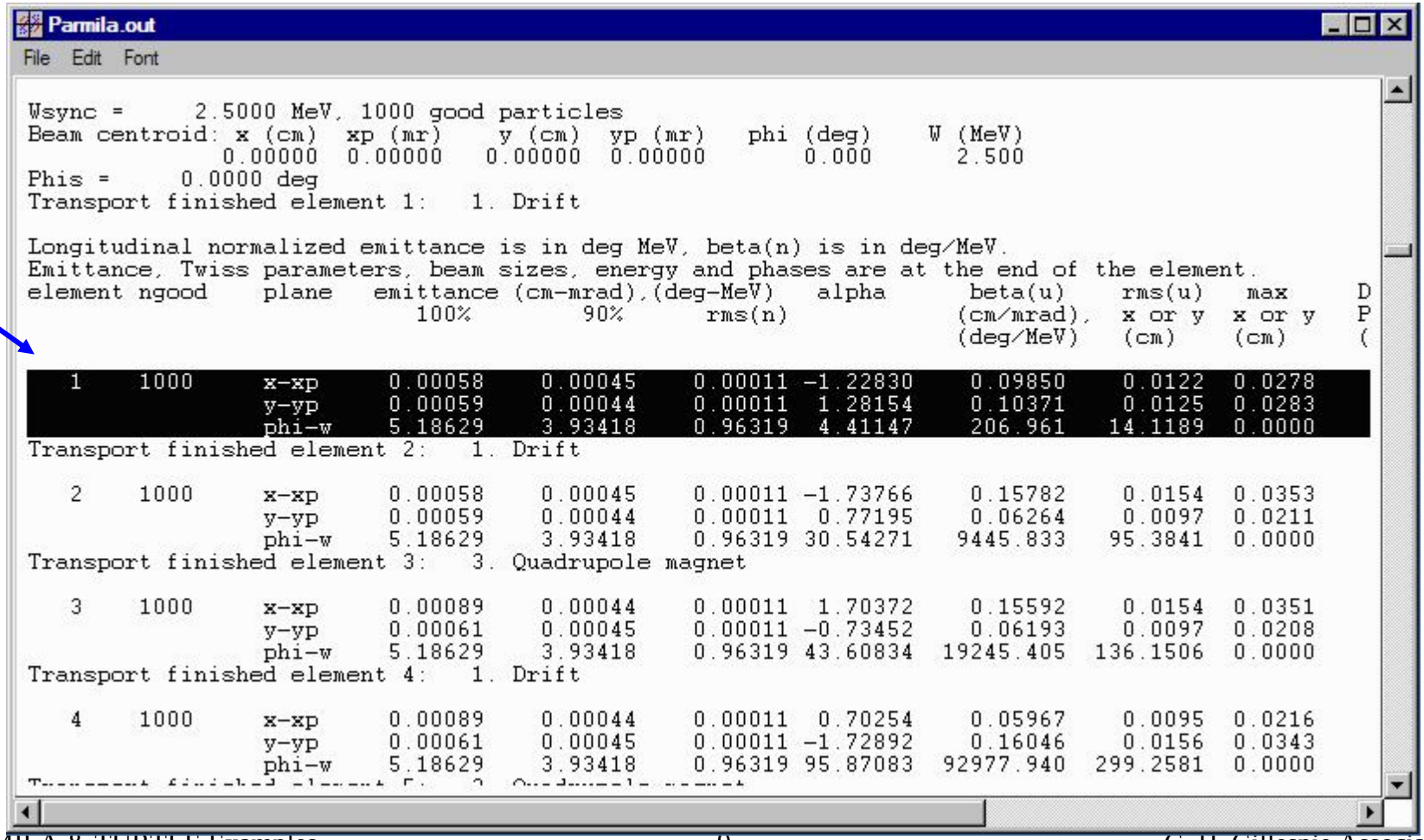
5. Using PARMILA & TURTLE to Study Some Beamlines (con't)

6. Use PARMILA-2 Command "Write and Run input.LIN"

The Main PARMILA-2 Output File Parmila.out Should Appear

Scroll Down & Browse Through the Parmila.out File

Eventually Stop When You Can See PARMILA's "element" No 1



5. Using PARMILA & TURTLE to Study Some Beamlines (con't)

Copy the 3 Data Lines for element 1

Scroll Down to See PARMILA's element 121

Paste the 3 Data Lines for element 1 just below element 121