Magnetic Field Map in MarlinTPC

Christian Grefe

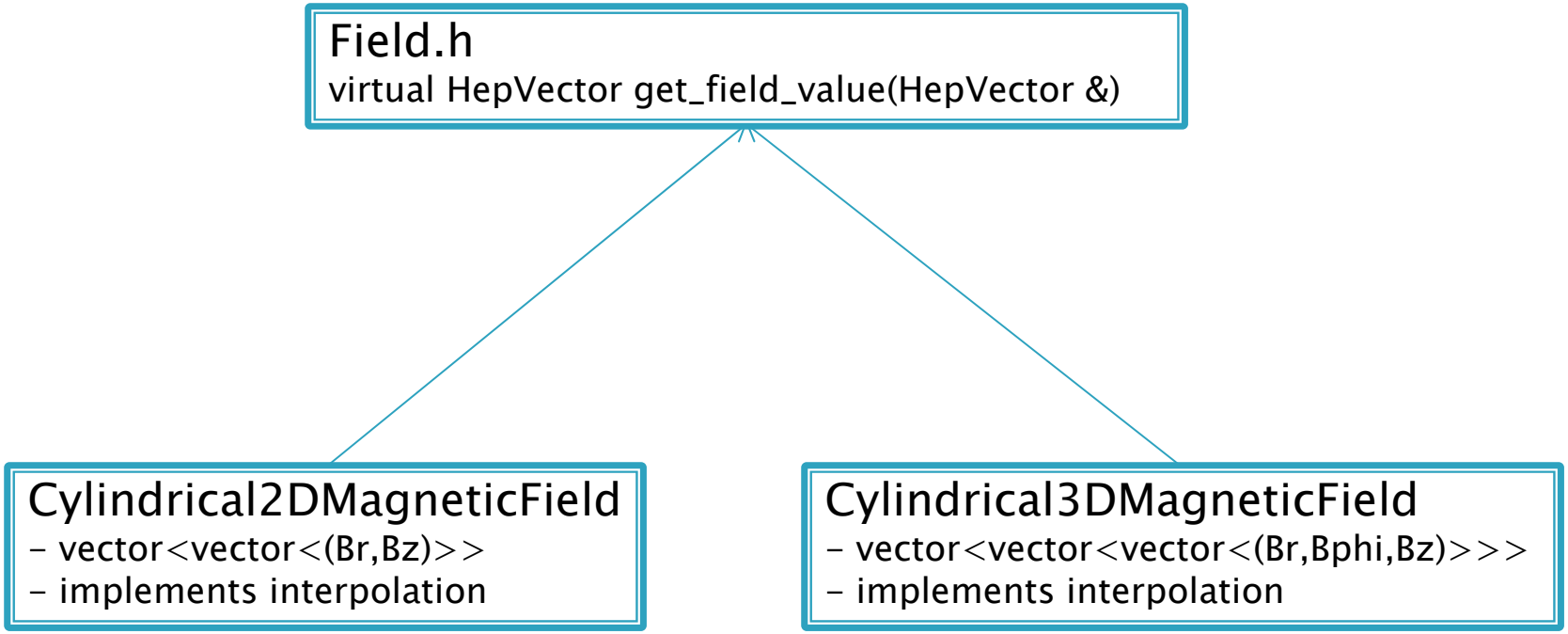
April 15, 2010

Magnetic Field Map

- Measured Data
  - Correct for global position and orientation
  - Correct for 24 hall probe positions and orientations
  - Correct for offset in measured field for each probe
- Parametrized Coil Model
  - Current, length, radius, space between wire layers
  - Number of wires and distribution given
- Fourier-Bessel-Expansion of Maxwells Eq.
  - 2D-Series of Bessel functions
  - For N, M $\rightarrow \infty$, can describe any field
- Data – CoilModel – FB-Model = 0 10 Gauss
- Map in coil coordinate system!

MarlinTPC interface

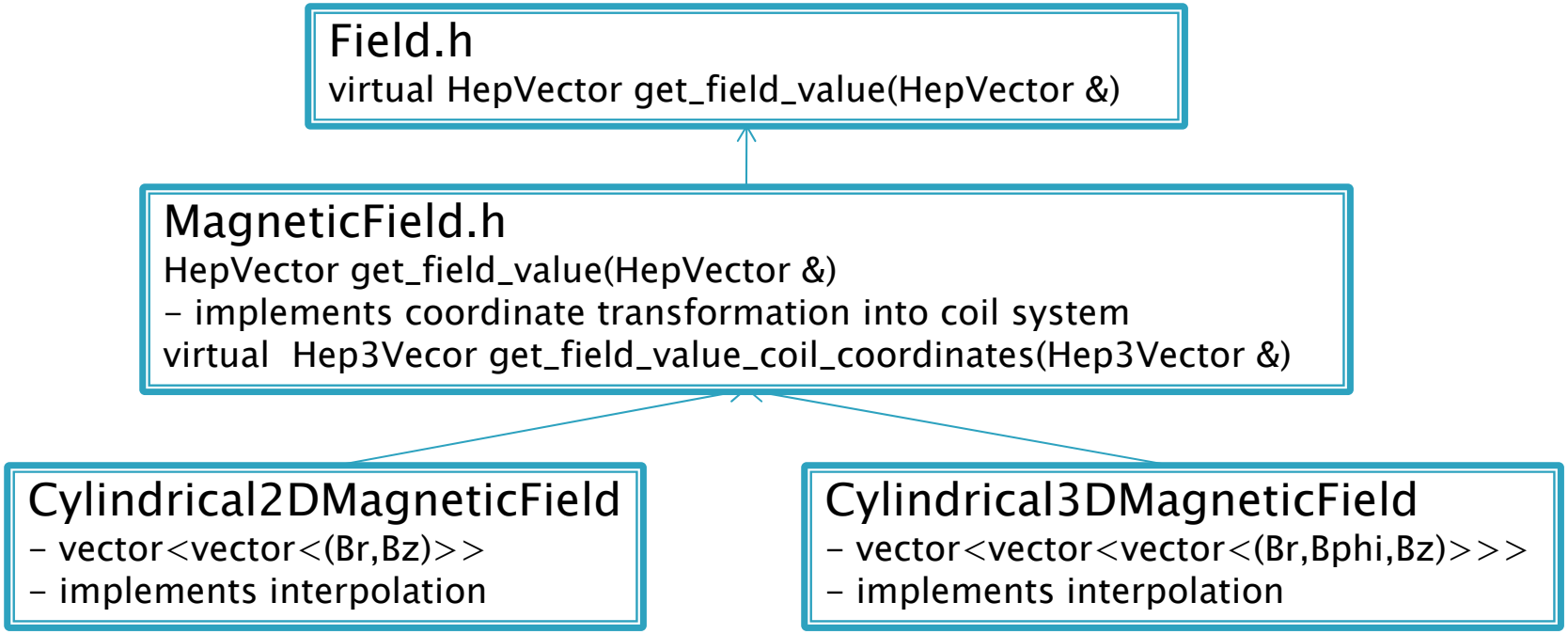
- Use existing interface /tools/Field/Field.h



- Takes LCCollection and stores field map into vector

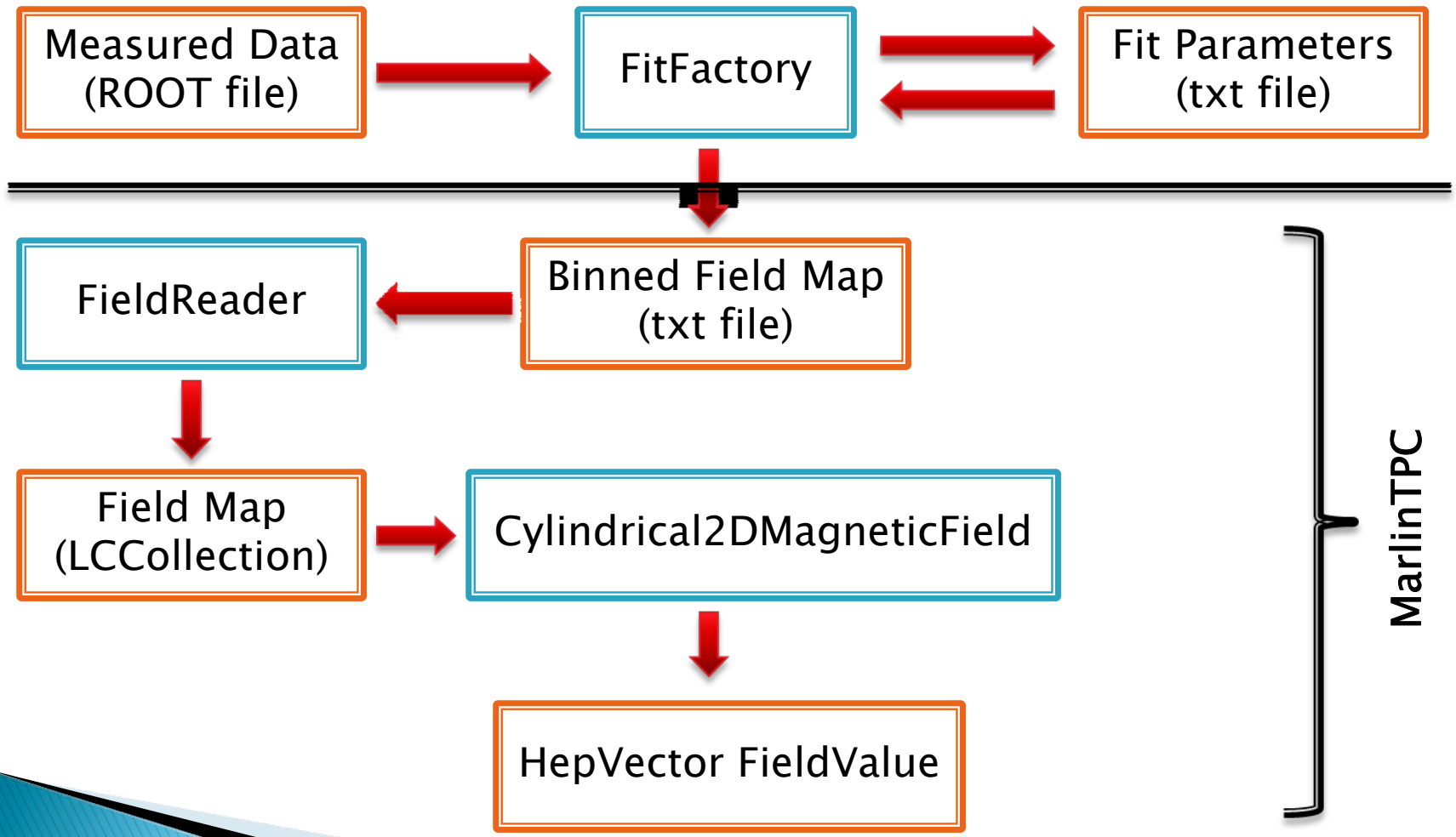
MarlinTPC interface

- Add layer to handle coordinate transformation



- This takes relative position and orientation of the TPC
- Why HepVector and not Hep3Vector?

Data Flow


Measured Data
(ROOT file)
FitFactory
Fit Parameters
(txt file)
FieldReader
Binned Field Map
(txt file)
Field Map
(LCCollection)
Cylindrical2DMagneticField
HepVector FieldValue
MarlinTPC

Content of field map text file?

- Name
- Description
- Type, i.e. Cylindrical2DMagneticField
- r_min, r_max, z_min, z_max
- bins_r, bins_z

- Actual field map
  - r, z, Br, Bz or Br, Bz
  - r and z are given by global parameters and entry number

Status

- MarlinTPC interface
  - MagneticField, Cylindrical2DMagneticField, Cylindrical3DMagneticField – done, needs testing
  - FieldReader – needs more work, need to define structure of input text file
- FitFactory – working
  - Adapt output to FieldReader input
  - Quite messy, not maintainable in this status
  - Needs some major rewriting (remove dependencies from private vector and rotation classes)
  - Could move into MarlinTPC afterwards