

FastSim Development Status and Plans

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FastSim work since October

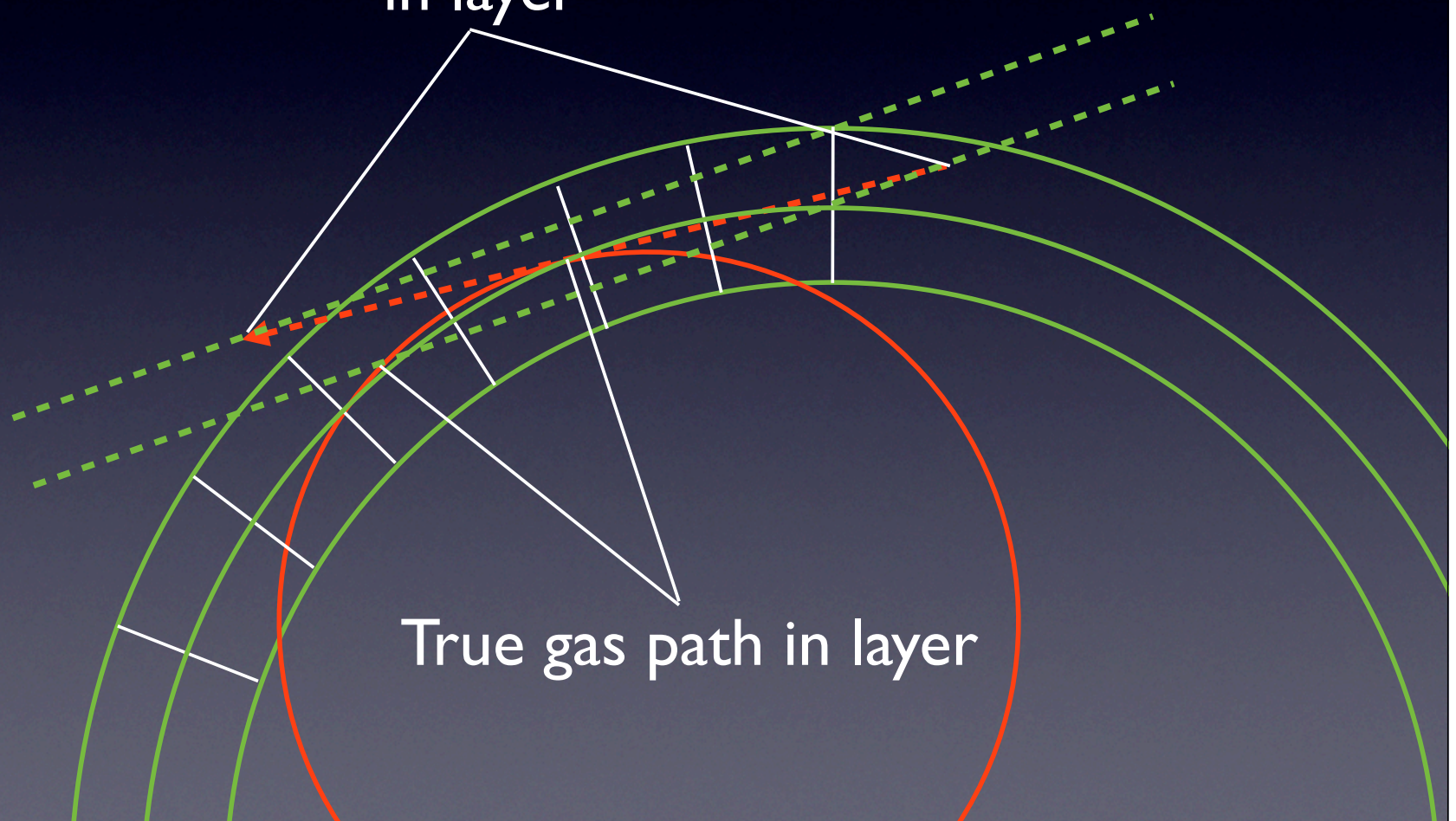
- Top-of-arc problems addressed
- Fix flaw in multiple scattering (log term)
- Code cleanup
 - refactorize hit merging and pat. rec. confusion
 - Improve measurement interface
 - Simplify edml (xml) config description
- Plan for release of public FastSim package
 - New public svn repository in Padova (FastSim)
 - renaming of classes and packages
 - removal of BaBar, SuperB dependencies

Top-of-arc problems

- FastSim models DC layers as cylinders
 - Hits generated as particle crosses fixed radius
 - Material effects computed from 1st order calculation
- Particle at top-of-arc goes transverse to layer
 - multiple hits in a single layer
 - gas material given by arc through layer
- FastSim fixes
 - Compute gas path using 2nd order calculation
 - Generate # hits according to gas path
 - $N_{\text{hits in layer}} \approx \text{pathlength/cellsize} + 1$

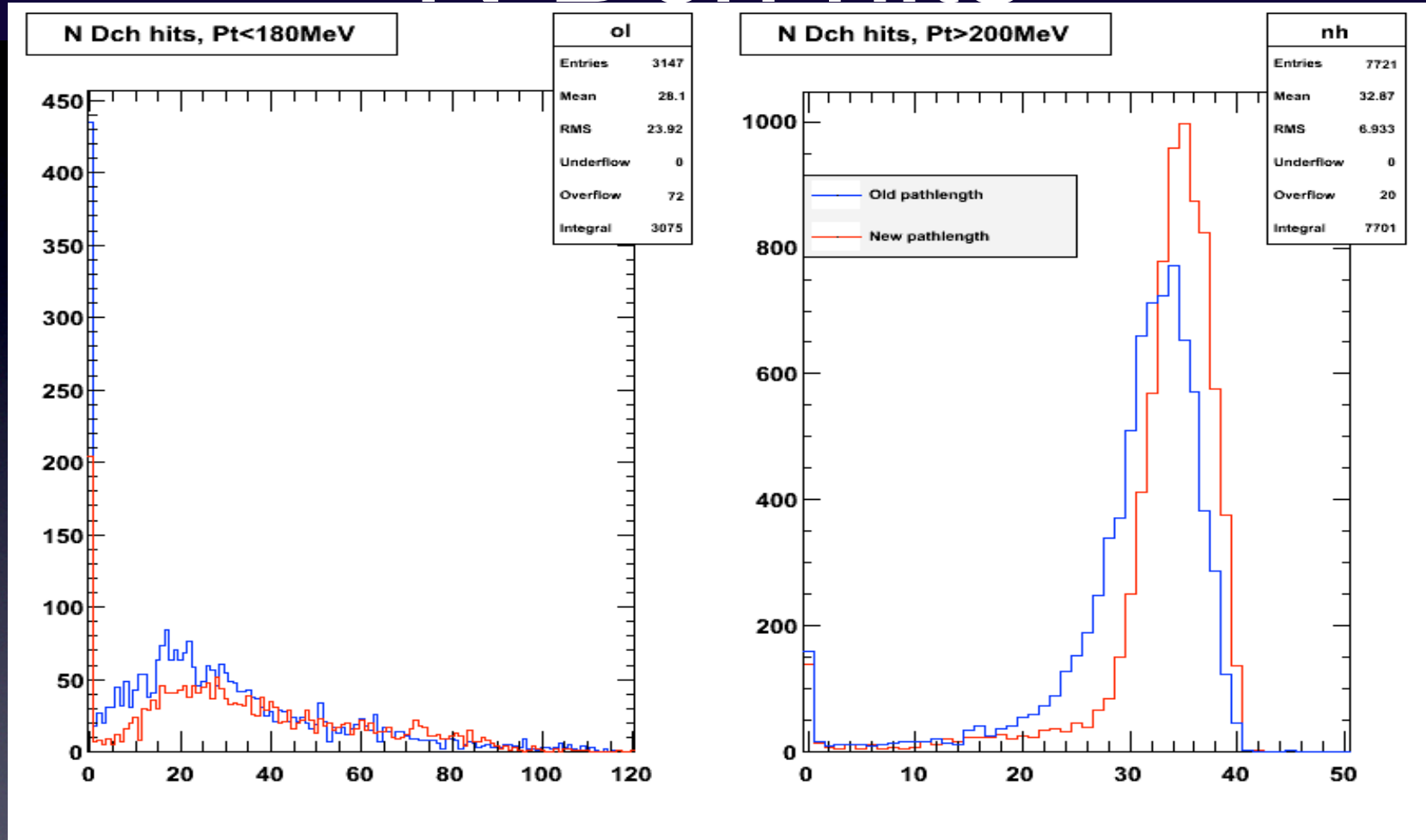
Top-of-arc

Linear estimate of gas path
in layer



True gas path in layer

N Dch hits



NB: Hit merging disabled with new pathlength!
SuperB cell size set to 1.8 cm, is that correct?

Multiple Scattering

- PDG $\theta_0 = \frac{13.6 \text{ MeV}}{\beta_{cp}} z \sqrt{x/X_0} \left[1 + 0.038 \ln(x/X_0) \right]$
 - Describes Gaussian approximation to 98% core
 - 11% accurate for $x/X_0 > 10^{-3}$
 - NB: 1cm Ar/Ethane has $x/X_0 \sim 10^{-5}$
 - **Cannot** be added in quadrature due to tails!
- FastSim was hardcoded to BaBar tuning
 - 2% 10X tails, $x/X_0 \sim 6\%$ in log term
 - Used in both simulation and reconstruction
 - **over-estimated** SuperB scattering (no support tube)
- Short-term fix: set x/X_0 to $\sim 2\%$ in log term
- Long-term fix: use full Moliere scattering model

Hit Merging Issues

- Merging assumed 1 simhit \leftrightarrow 1 tracking hit
 - no longer true after top-of-arc fix
- Hit proximity hard-coded to cylindrical geometry
 - Stereo hits in Dch
- Work in progress to address these problems
 - Merging performed on track hits (D. Roberts)
 - Hit proximity calculation generalized to all geometries

Measurement Improvements

- Specific interfaces removed from base class
 - createHots, createdEdx, ...
 - Accessed through downcasting
- Read config parameters from constructors
 - simplifies measurement factory
- >1 measurement associated with element
 - `<cyl name="dch-He-lbu" ... meas="Stereo-,DchdEdx" />`
- TODO: generalize measurements to all geometries
 - Emc, Dirc, TOF, ... on cylinders, planes, cones, ...

Under Development

- Improved model of energy straggling (dE/dx)
 - Vavilov function instead of truncated Gaussian
- Updated fortran compiler version for MacOS
 - needed for root 2.6 and beyond
- Re-organize EDML (ExDML) parsing
 - Convert detailed attributes to config parameters
 - More flexible, open to modification
- Remove BaBar code from Generator interface
 - Particles as TParticle instead of GTrack

Public Release

- Host public FastSim repository at Padova
 - Initially open to public read/write
 - restrict write access??
- Staggered release
 - 1st: core material simulation and geometry
 - 2nd: measurements and 'reconstruction'
 - will require approval from BaBar council
 - 3rd: generators and SuperB adapter
- SuperB specific (User) code and config will stay in protected repositories