The DIRC and the FCAL

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Geometry

- Placed a 2.45m x 2.45m sheet of quartz crystal in front of the TOF.
  - Z=595cm in detector coords
- 20mm thick (initially)
  - 17mm quartz + some to approximate assembly
- Let geant compute rad length

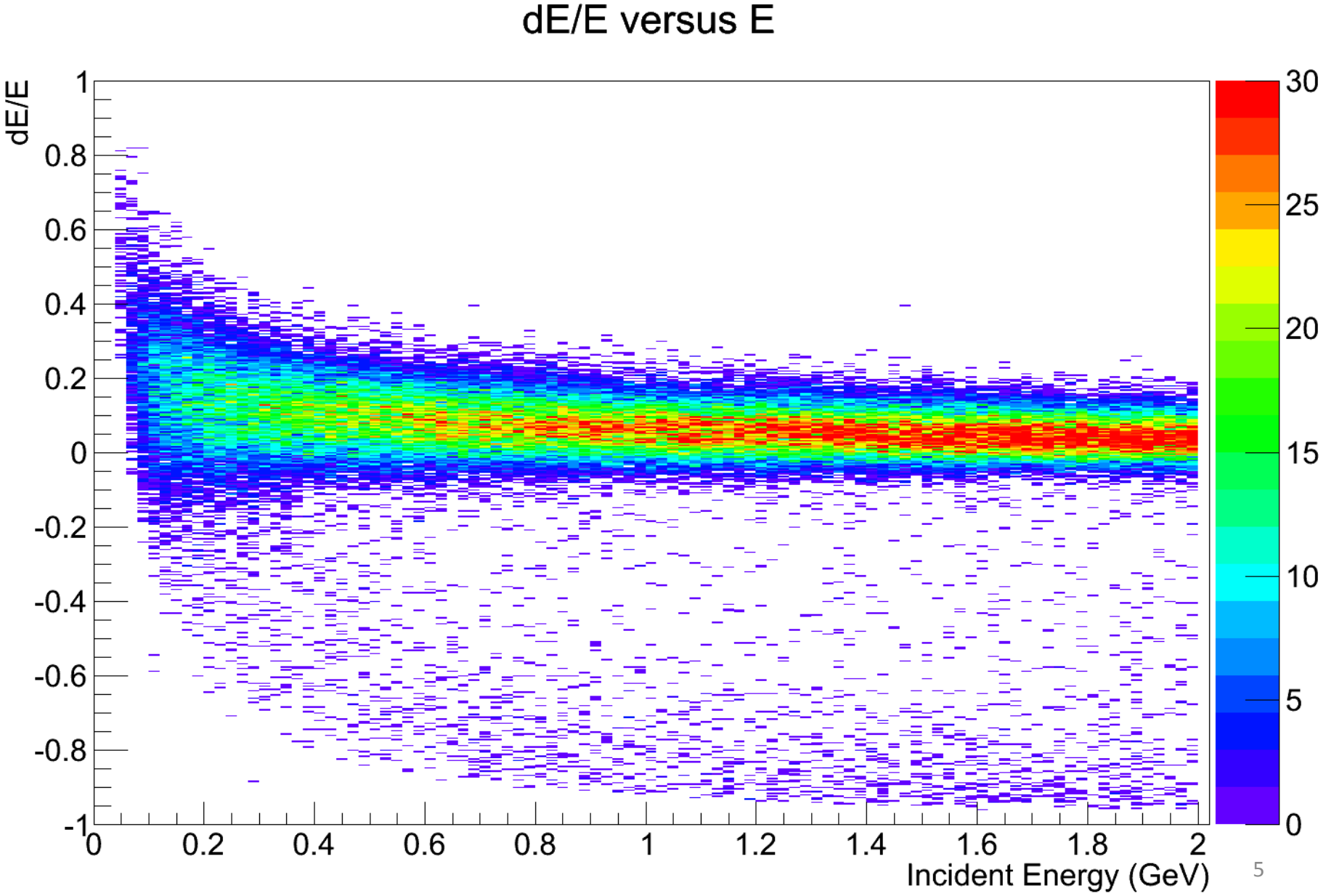
Particles

- Throw 100k photons at random angles and random energies (0-2 GeV)
  - Lose some down the beampipe

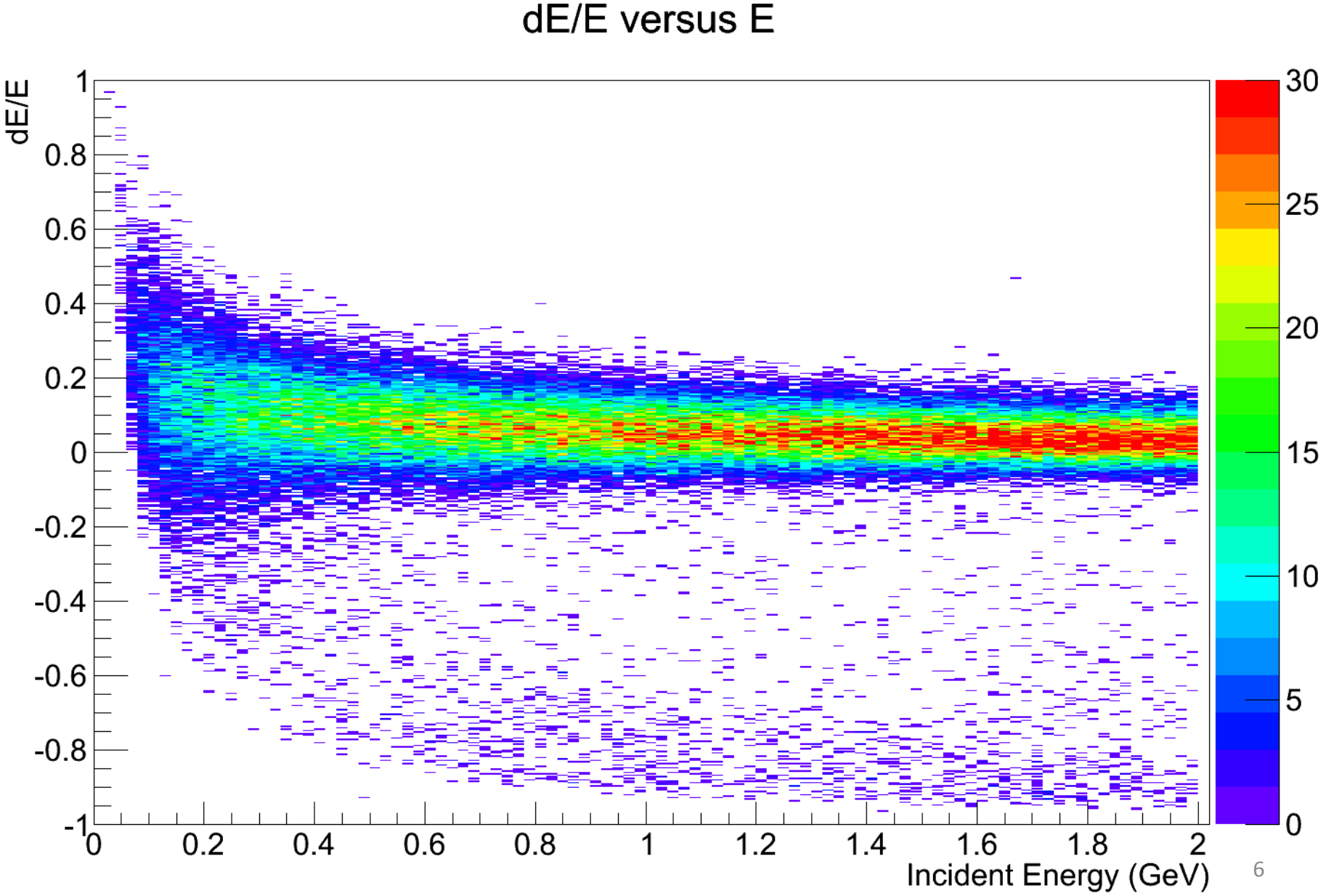
Analysis

- Use “NeutralParticleHypothesis”
  - If num_hypotheses != 1, declare it lost
  - Find dE/E and calibrate to 0 in bins of E_mc
  - Define anything outside +- .2 in this to be lost as well
  - Remaining particles define efficiency

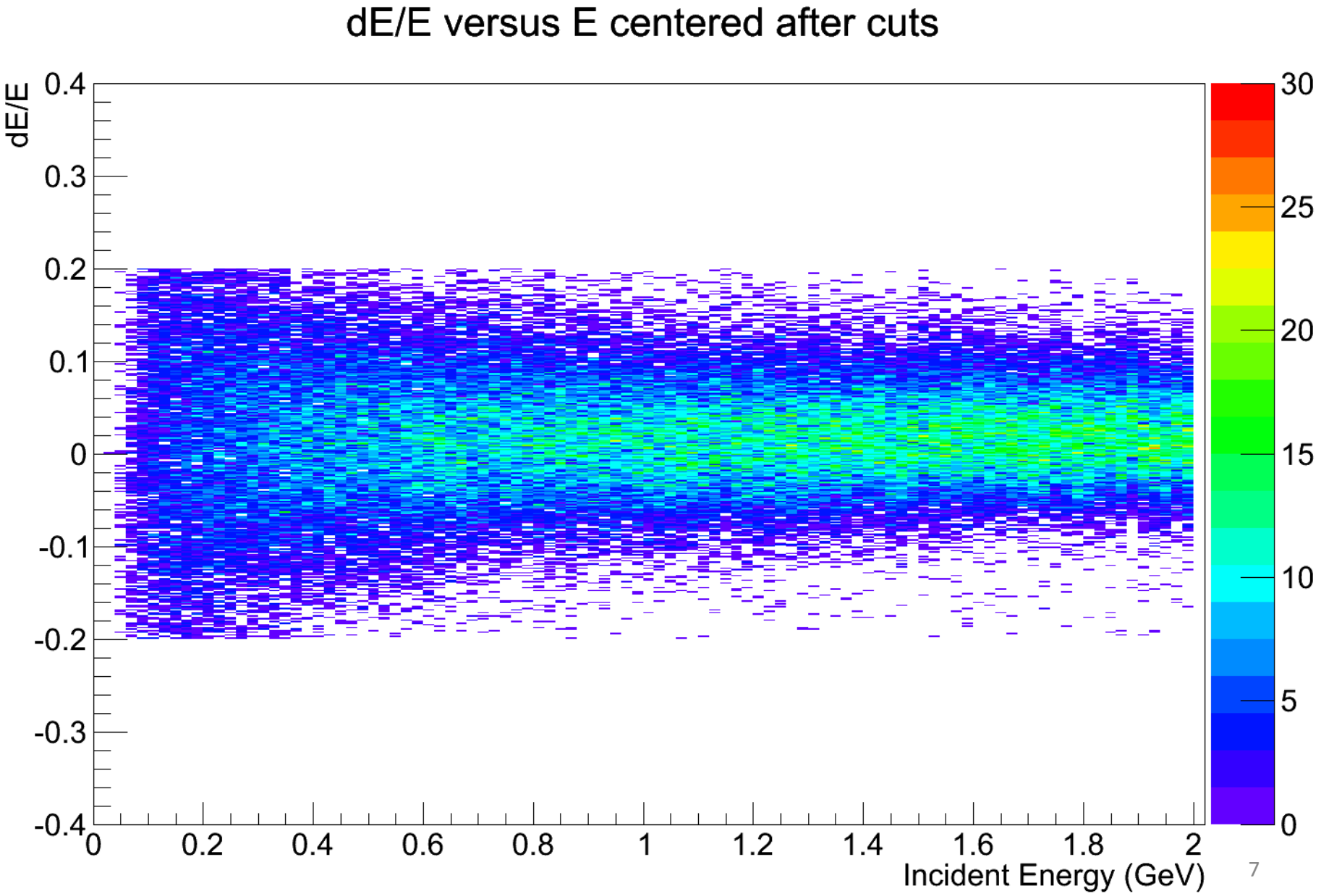
Energy reconstruction w/o quartz



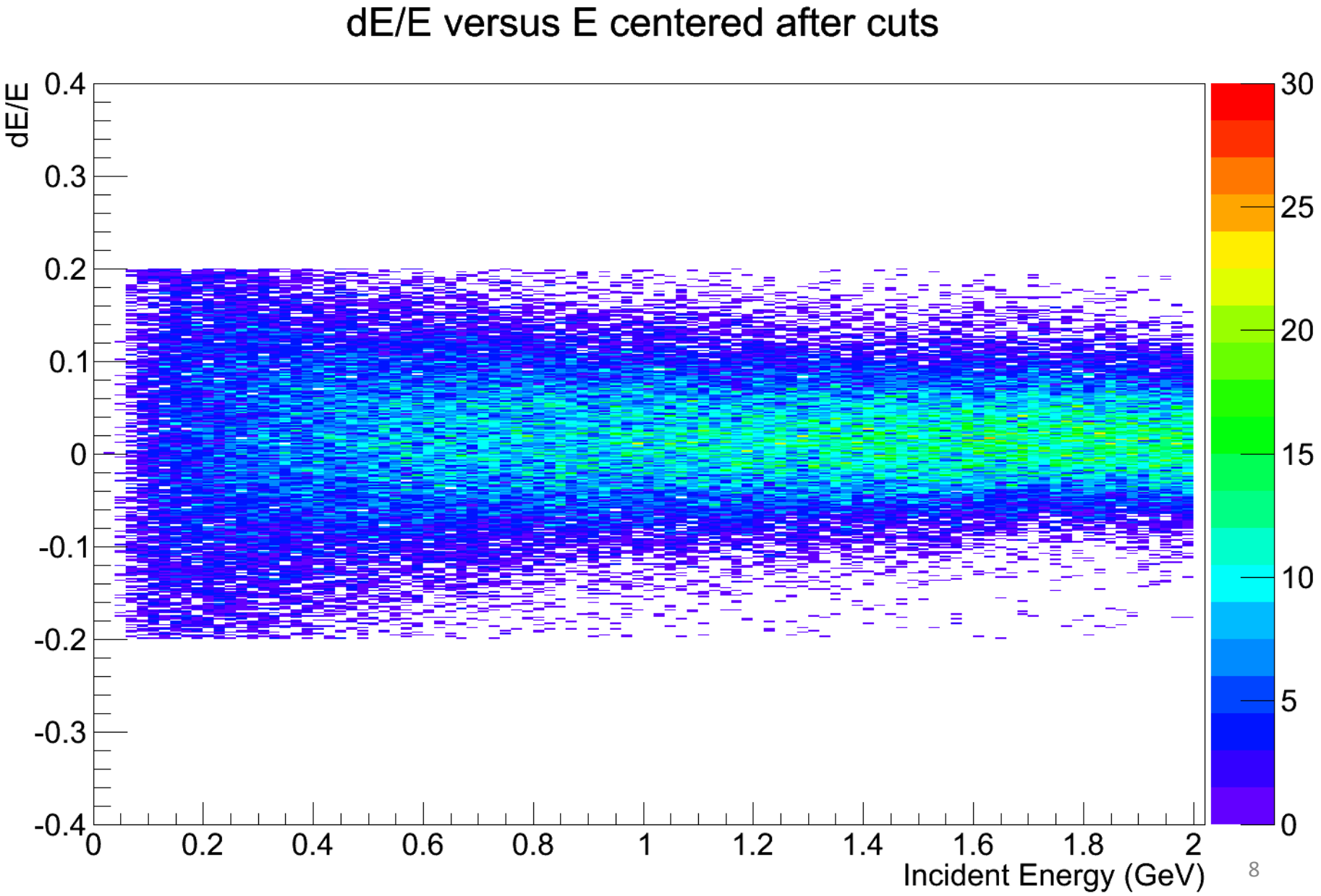
Energy reconstruction with 20mm quartz



Energy reconstruction w/o quartz



Energy reconstruction with 20mm quartz



Efficiency versus energy for various amounts of Quartz

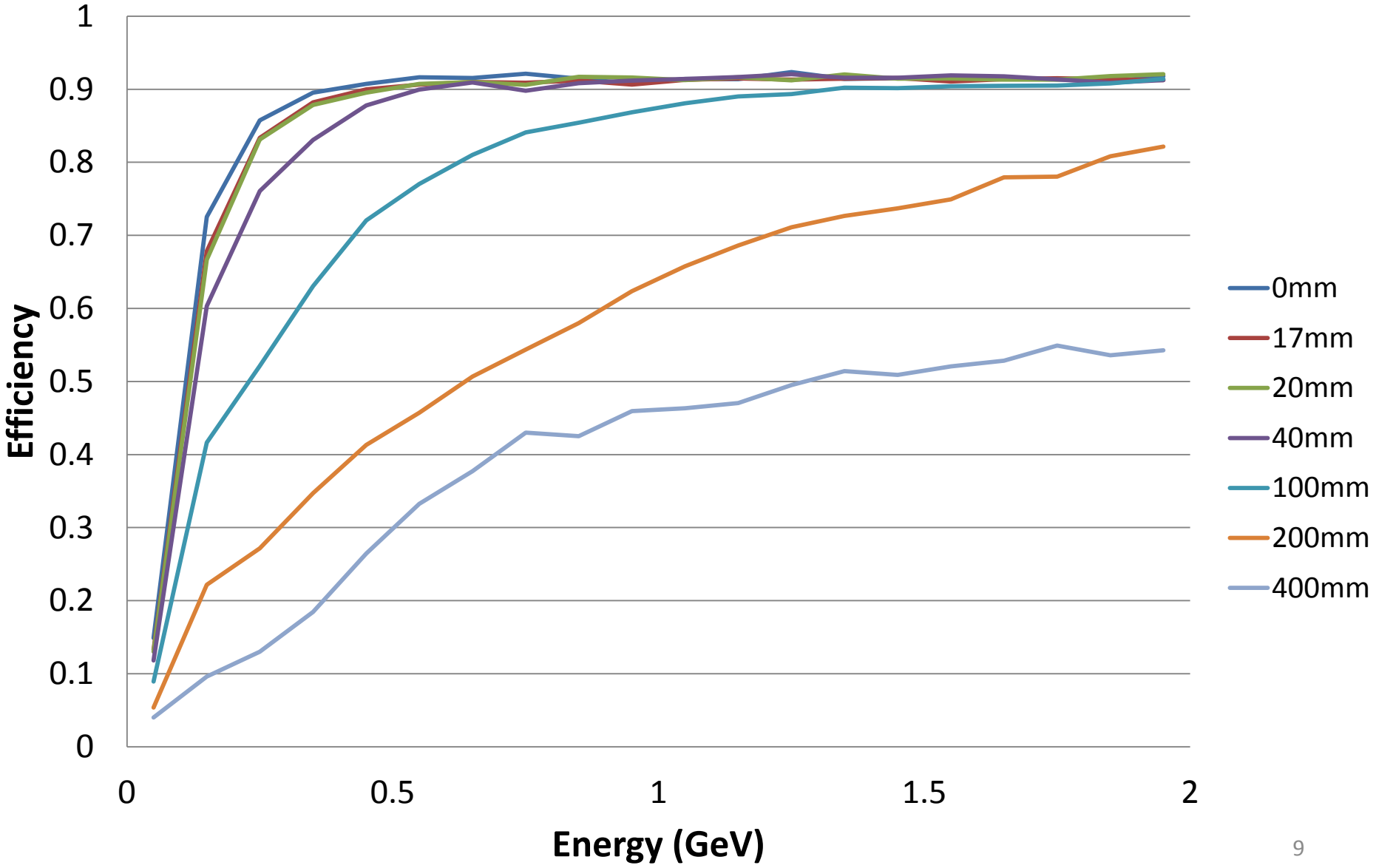


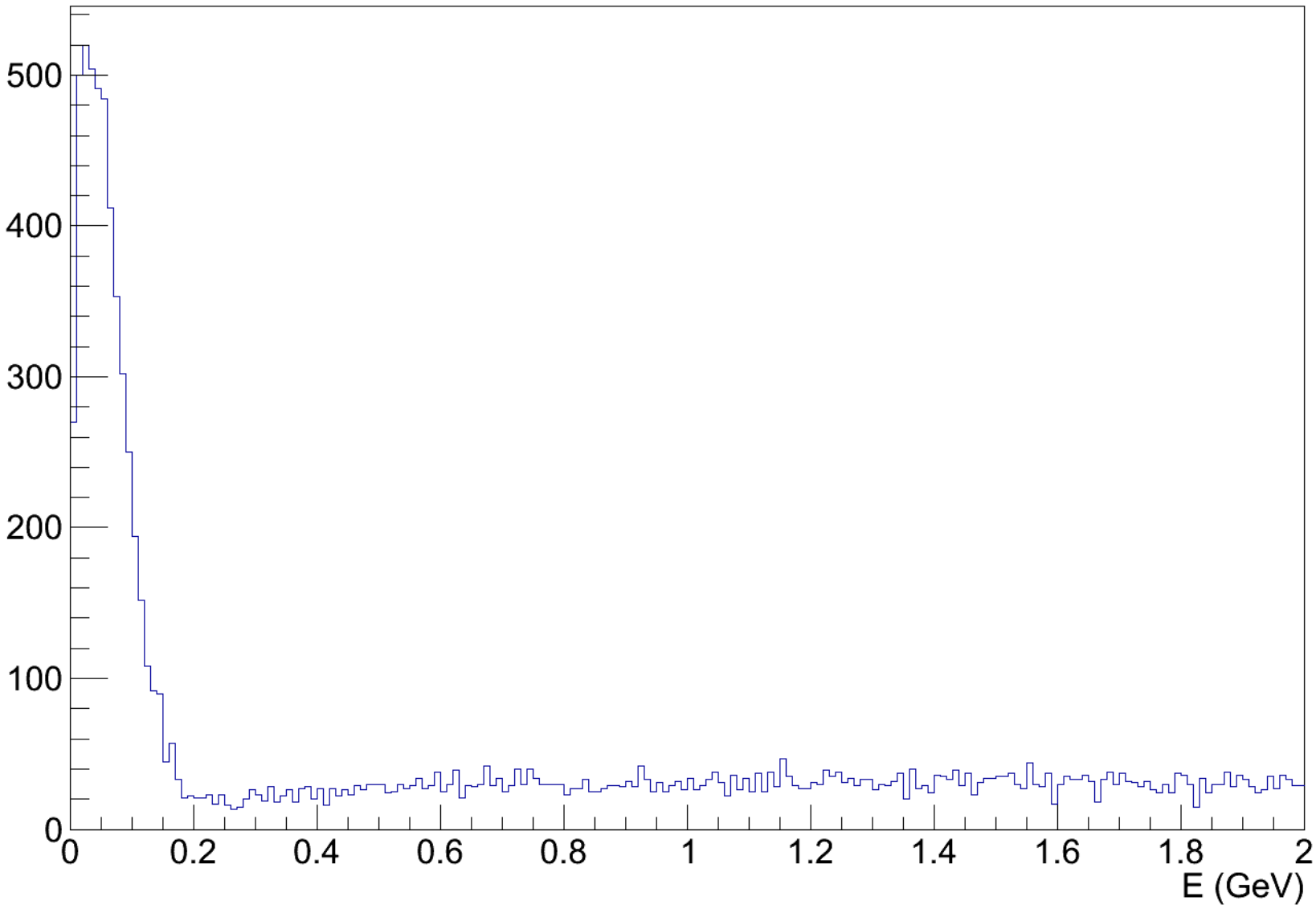
Table of other values and for other thicknesses

mm Quartz	lost hyps	seen	passed cut	Err_E	dR shower	dTheta	Eturn*
0	9632	90196	86338	0.158	0.777	0.391	0.16
17	10196	89622	85495	0.152	0.787	0.37	0.17
20	10199	89627	85476	0.152	0.794	0.372	0.18
40	10439	89330	84378	0.15	0.802	0.345	0.2
100	12616	86945	77697	0.158	0.877	0.303	0.26
200	16875	82041	57234	0.218	1.038	0.2961	0.44
400	23427	71404	38999	0.3523*	1.252	0.2325	0.9

*Not even close to being centered on zero

**Energy above which almost all photons produced at least 1 shower

Sample lost E – 20mm



Things to do

- Understand exact positioning within geometry
- Find exact radiation length of whole DiRC assembly
- Run farther from the TOF
- Higher Energies/Different Particles