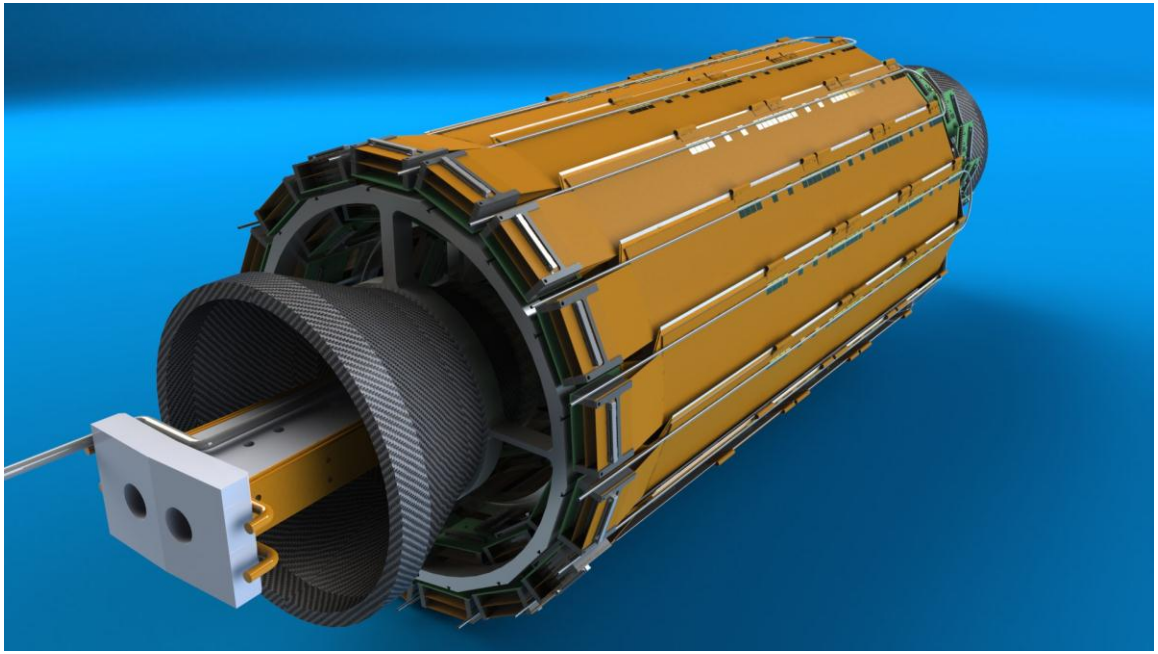


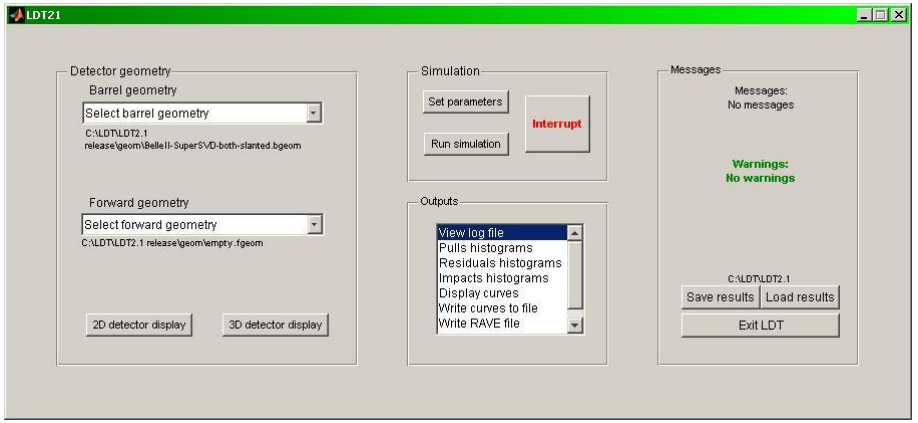
Fast simulation of the new SVD design

M. Valentan (HEPHY Vienna)

SVD-PXD meeting, Vienna

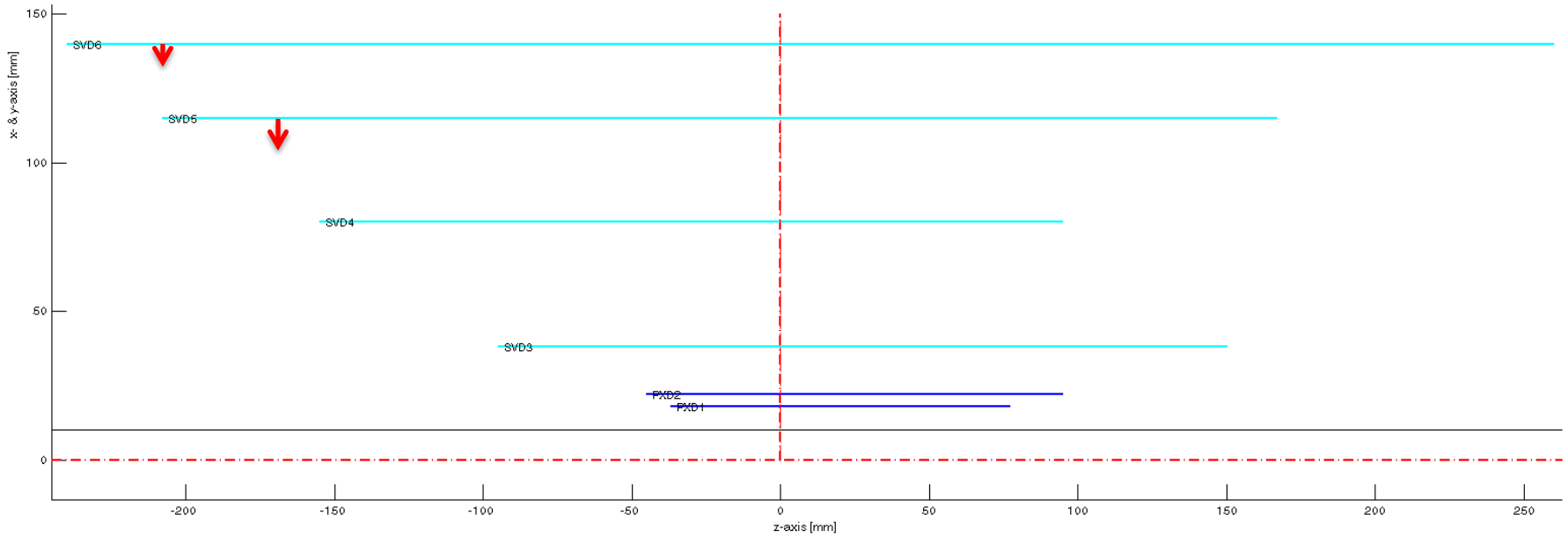
6 February 2012

LDT (LiC Detector Toy)



- Simple, but flexible and powerful stand-alone tool, written in MatLab
- Geometry
  - Cylinders and disks
  - Material, resolutions, inefficiencies
- Simulation
  - Solenoid field, helix track model
  - Multiple scattering, measurement errors and inefficient measurements
  - *No further corruption, no pattern recognition*
  - Strips and pads, uniform and gaussian errors, TPC
- Reconstruction
  - Kalman filter
  - Fitted parameters and corresponding covariances at the beamtube
- Output
  - Resolution of the reconstructed track parameters inside the beam tube
  - Impact parameters (projected and in space)
  - Test quantities (pulls, χ^2, etc.)

Detector parameters



	PXD1	PXD2	SVD3	SVD4	SVD5	SVD6
Pixel size or point resolution [µm]	50x50	50x75	6x31	10x60	10x60	10x60
Radius [mm]	18	22	38	80	115 (105)	140 (135)

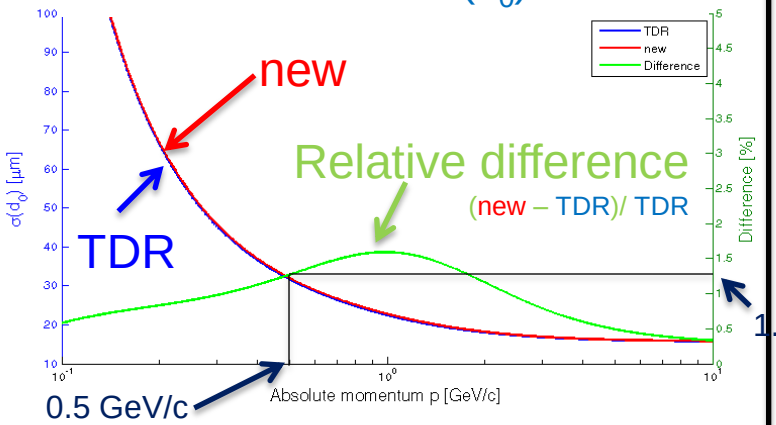
Simulation parameters

- Compare resolutions of impact parameters (point of closest approach) of both setups
  - Projected impact parameter d_0 in x-y-plane
  - Impact parameter d_z in z
- Simulation parameters
  - Resolution of impact parameters as function of the absolute momentum; $0.1 \leq p \leq 10$ GeV/c
  - For single muons
  - Perpendicular to axis ($\theta=90^\circ$) and under 45°

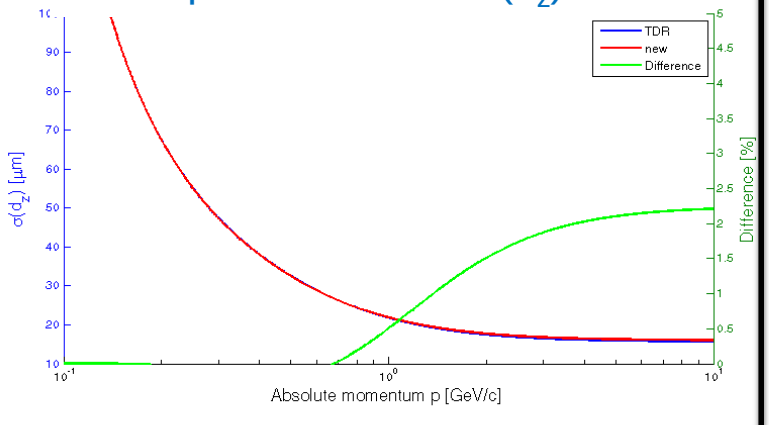
Comparison of setups

θ=90°

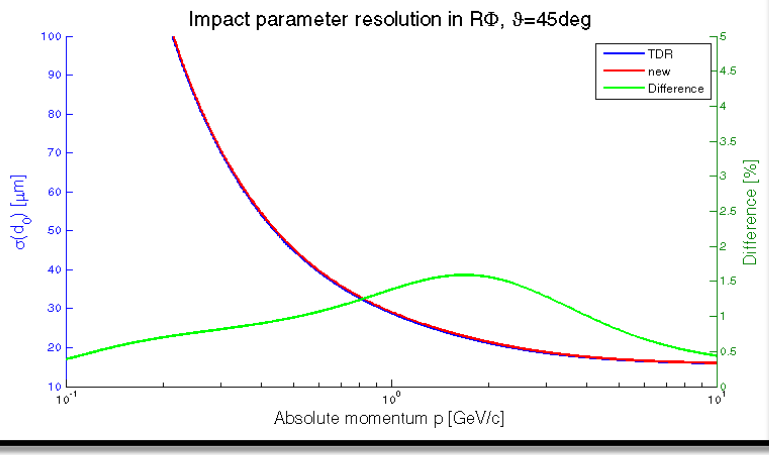
Projected impact parameter resolution $\sigma(d_0)$

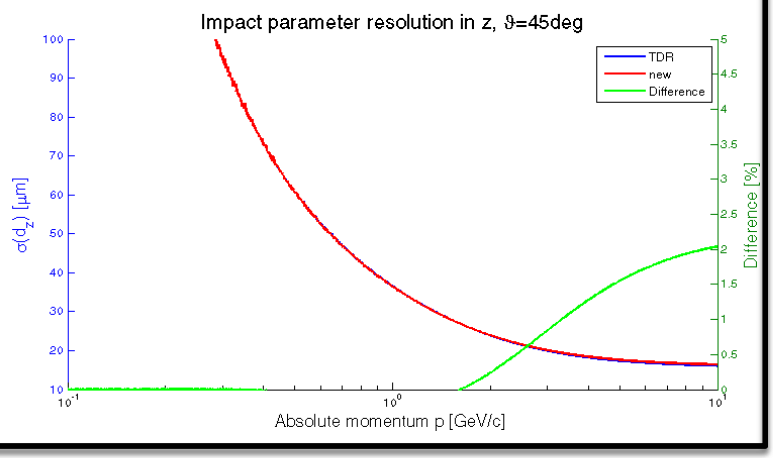


Resolution of impact parameter in z $\sigma(d_z)$



θ=45°





Conclusions

- New design slightly worse than TDR design
- Representative momentum: p = 0.5 GeV/c
  - Relative difference of 1.27% for d_0 at 90°
  - Relative difference of 0.98% for d_0 at 45°
- **This small change of performance alone is no reason to favor one design over the other!**
- Coffee break: live demonstration of LDT on my laptop, if someone is interested!


That's all Folks!