



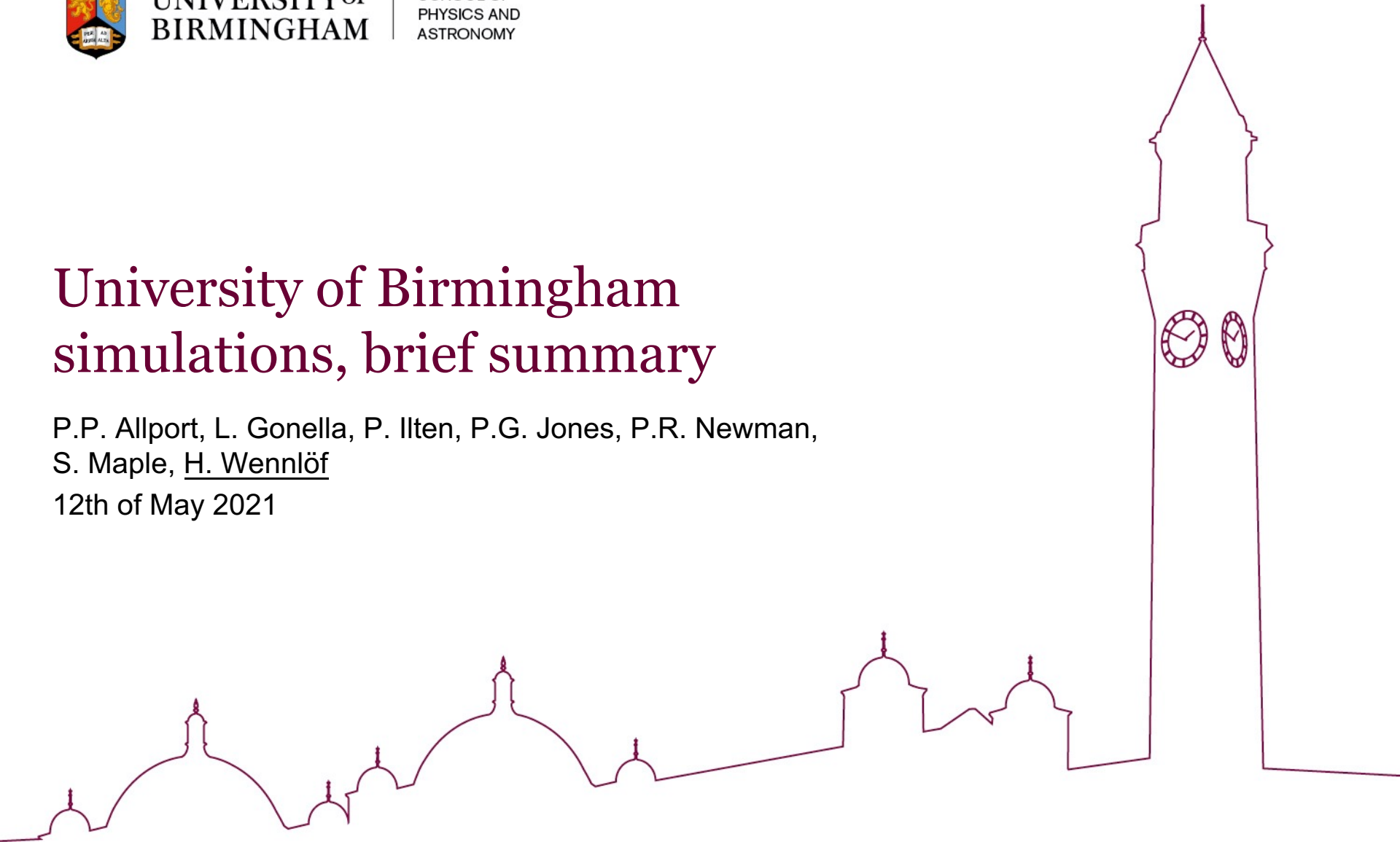
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University of Birmingham simulations, brief summary

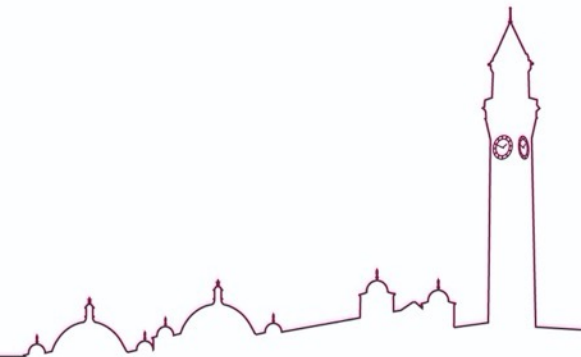
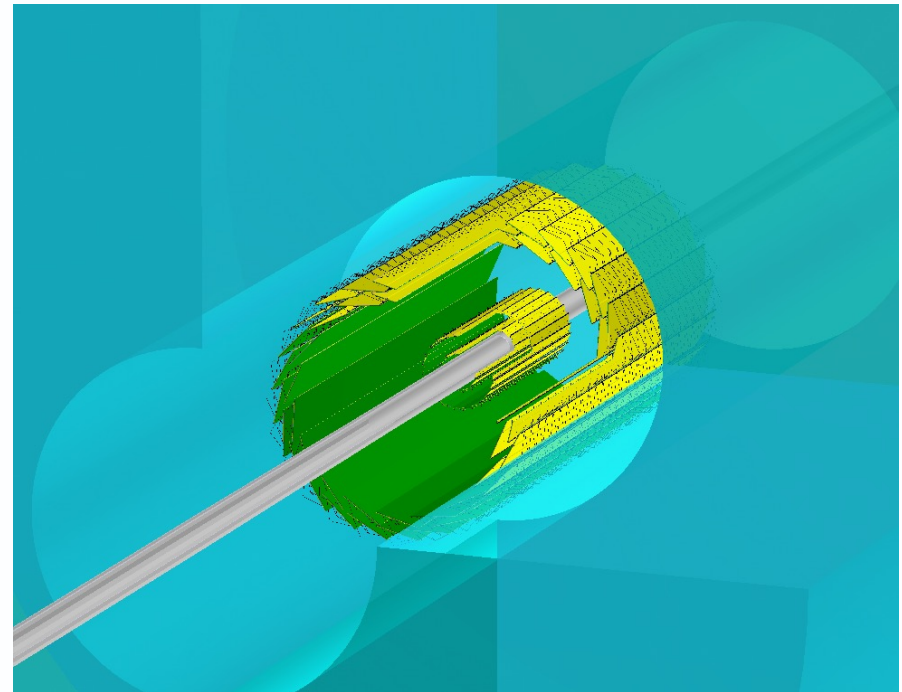
P.P. Allport, L. Gonella, P. Ilten, P.G. Jones, P.R. Newman,
S. Maple, H. Wennlöf

12th of May 2021



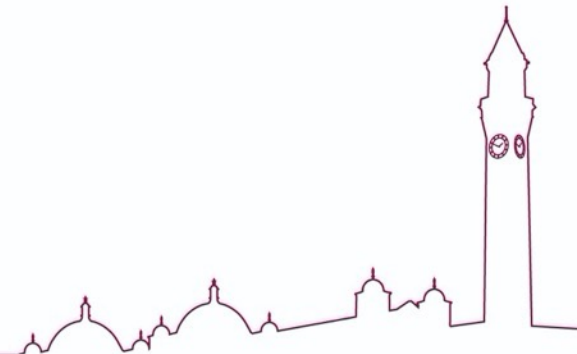
EICROOT simulations

- Ongoing at UoB since 2017
- Details of work carried out up until early 2020 can be found here:
<http://go.web.cern.ch/go/xKk6>
- EICROOT contains barrel layer and disk construction using individual detector staves, which is useful for building accurate geometries. Material budgets of staves can be trimmed by varying material thicknesses
- Only single-particle simulations performed in this framework



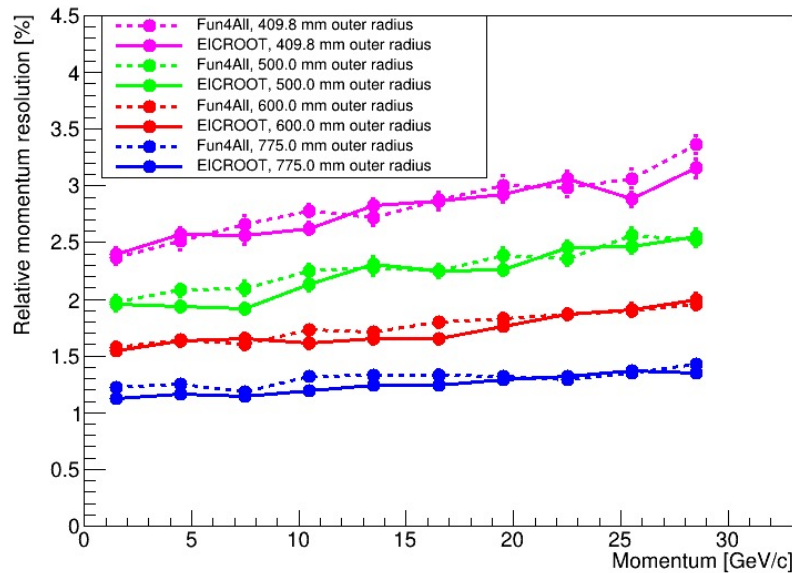
Transferring to Fun4All

- Utilising the GDML export functionality in EICROOT, and tweaking a GDML importer in Fun4All
- GDML importer available here: <https://gitlab.com/hwennlof/fun4allgdmlimport>
- Here are files for the YR hybrid baseline, with ITS3-like silicon layers: <https://gitlab.com/hwennlof/fun4allgdmlimport/-/tree/master/macros/hybridBaseline>
- Some details about altering geometries in EICROOT can be found here: <https://gitlab.com/hwennlof/eicrootlayoutfiles>
- In EICROOT, the default EICROOT TPC was used for studies containing a TPC
- In Fun4All, the default EIC TPC available was used; https://github.com/sPHENIX-Collaboration/macros/blob/master/common/G4_TPC_EIC.C
 - Also added the TPC endcap subsystem, in its default configuration

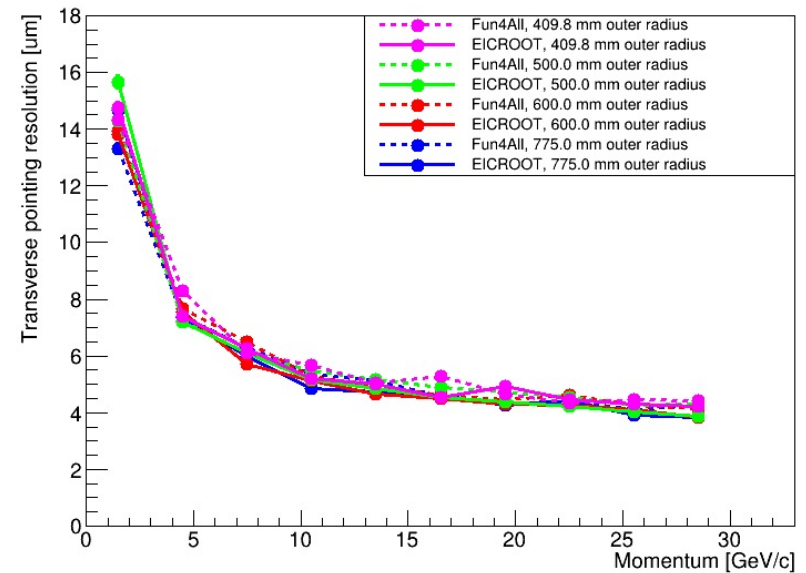


Benchmarking results, EICROOT and Fun4All

Relative momentum resolution



Transverse pointing resolution

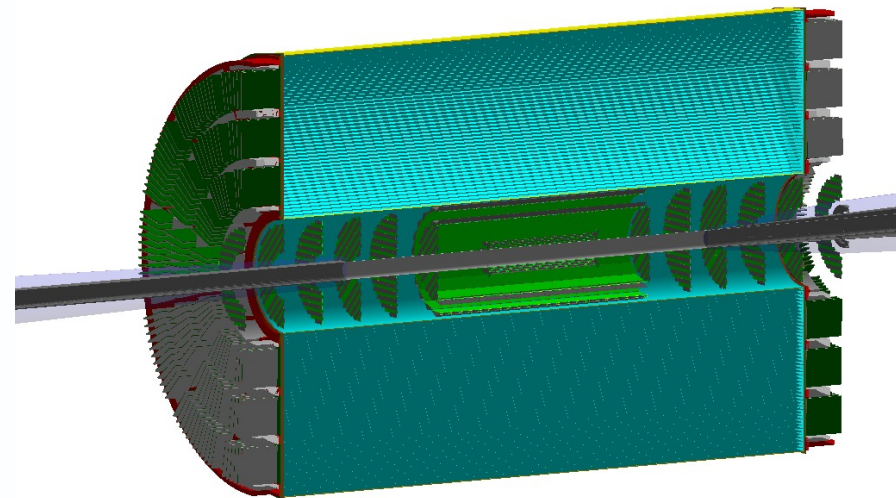


- Comparing different tracker outer radii (an all-silicon design, so nominally exactly the same tracker design in both frameworks)
- Filled lines are results from EICROOT, dashed lines from Fun4All
- There is good agreement between the two frameworks (so geometry export/import works as intended)

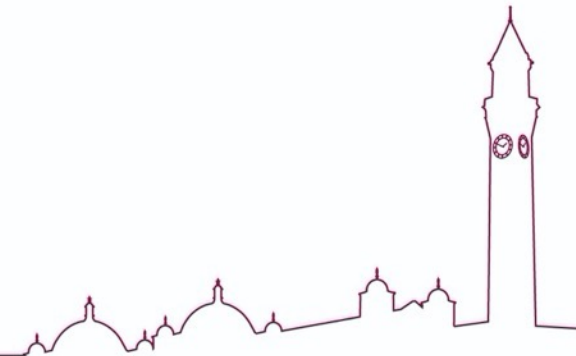


TPC hybrid baseline, combining EICROOT and Fun4All

- Silicon barrel and disks imported from EICROOT
- Beampipe, TPC, and TPC endcaps from Fun4All
- The same silicon parts were also combined with an implementation of the MPGD layers
- All results from Fun4All simulations will be made available via thesis. Much is available in Yellow Report Tracking WG meetings (see **backup slide** for links). This includes studies using ep collisions and charmed mesons

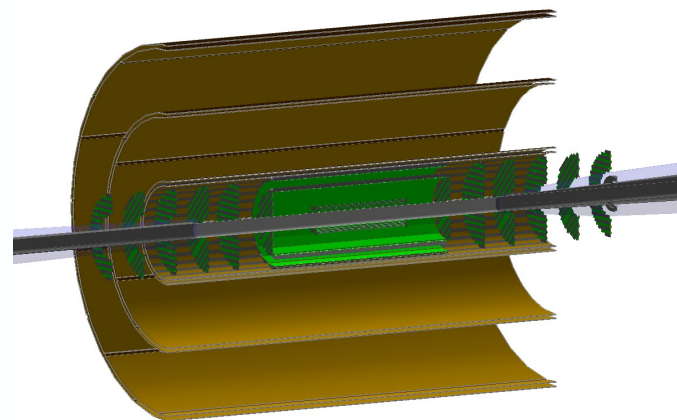


TPC hybrid baseline detector



Suggested next steps

- Move SVT geometry creation into Fun4All, using for example the [EicToyModel](#)
 - Very similar in setup to EICROOT, so should be possible to move over without too much trouble ("just" requires time)
- Implementation of **services outside of the staves**
- Using latest magnetic field maps and beampipe
- Interfacing with **MPGDs and GEMs** to create a full hybrid MPGD concept
- Moving to ACTS or KFparticle for reconstruction



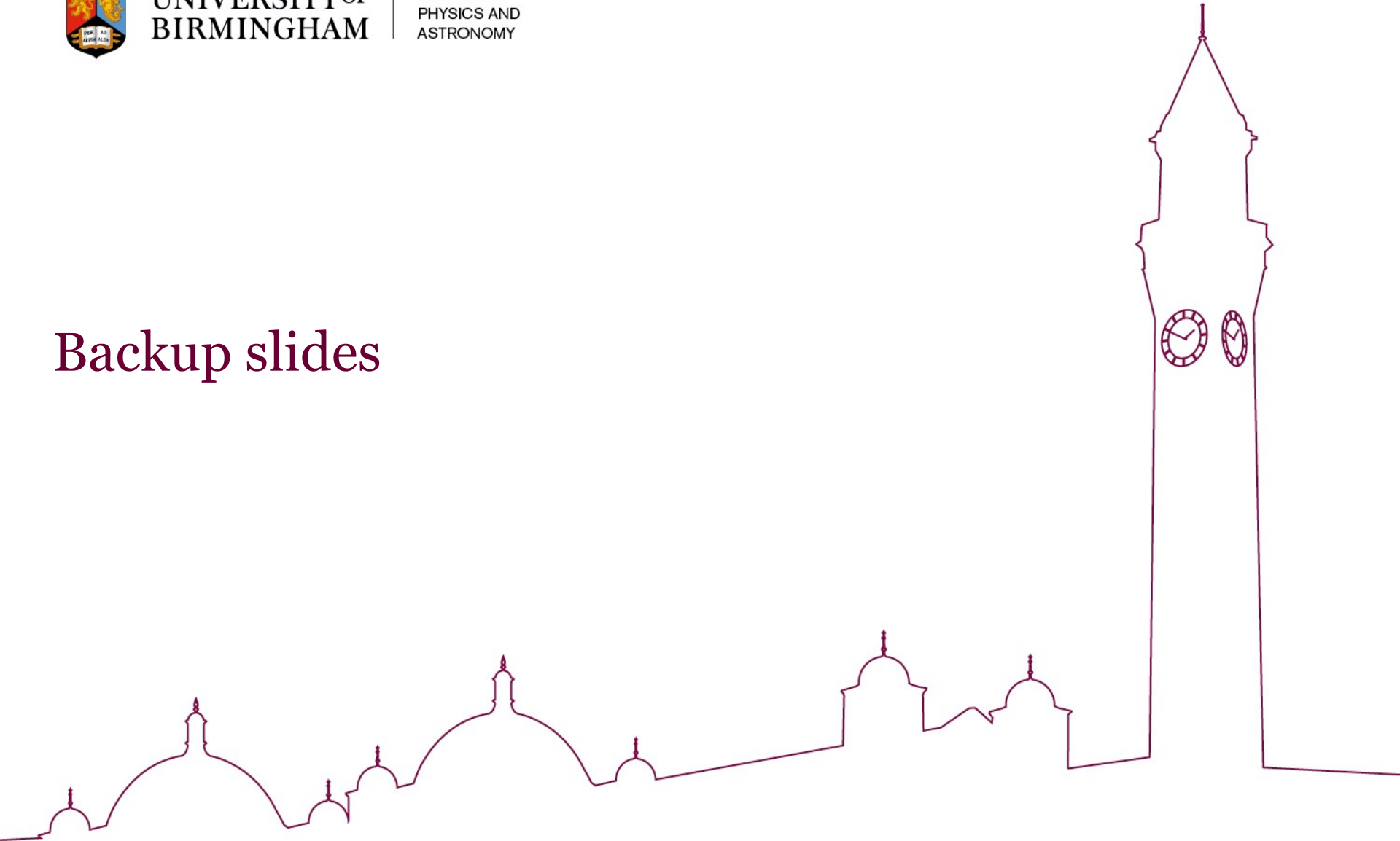
Silicon plus MPGD



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Backup slides



Tracking WG presentations

- https://indico.bnl.gov/event/7689/contributions/35412/attachments/26828/40847/UoB_TrackingWG_200227.pdf
- https://indico.bnl.gov/event/7888/contributions/36421/attachments/27480/42035/UoB_TrackingWG_200402.pdf
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