

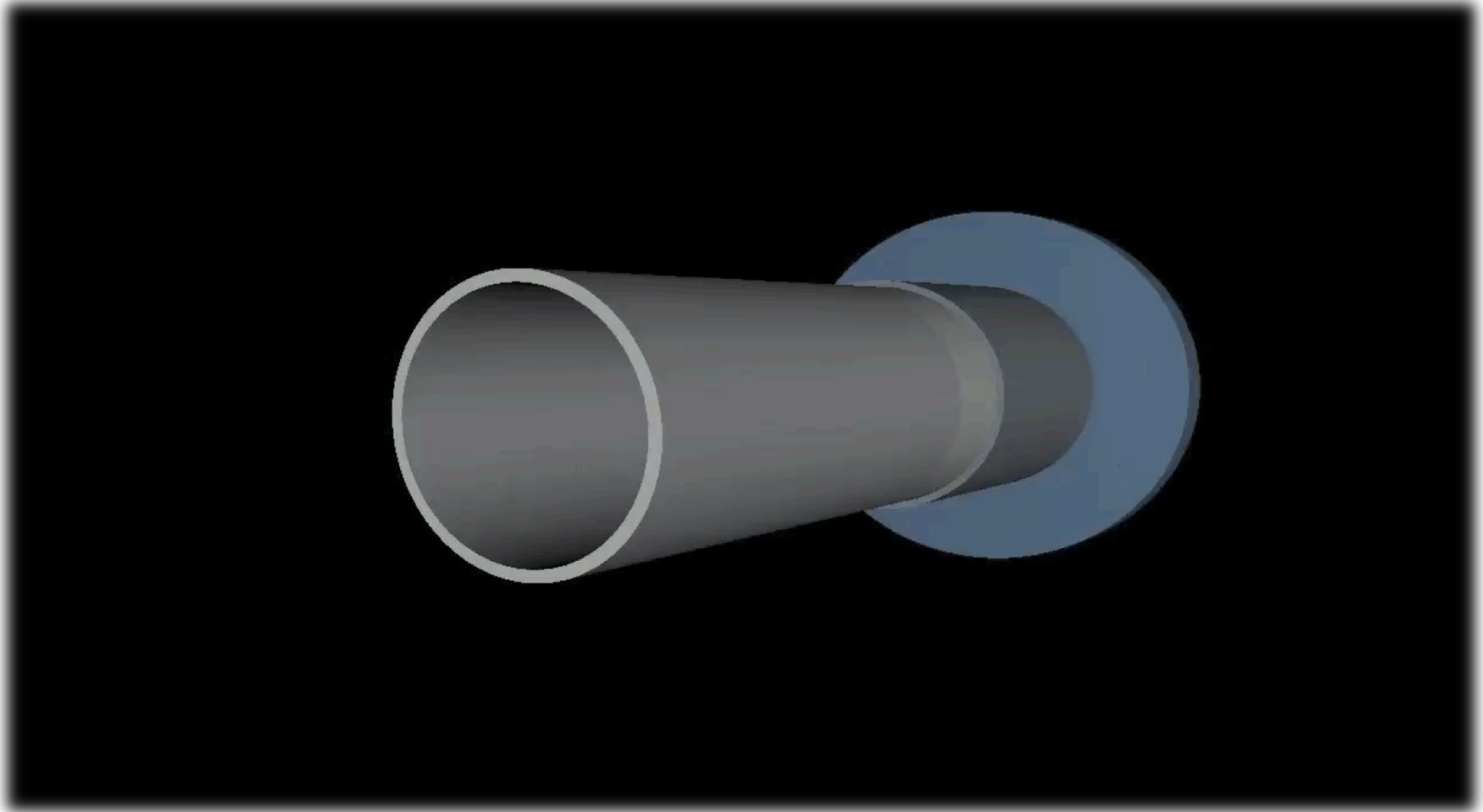
Focusing DIRC in FullSim

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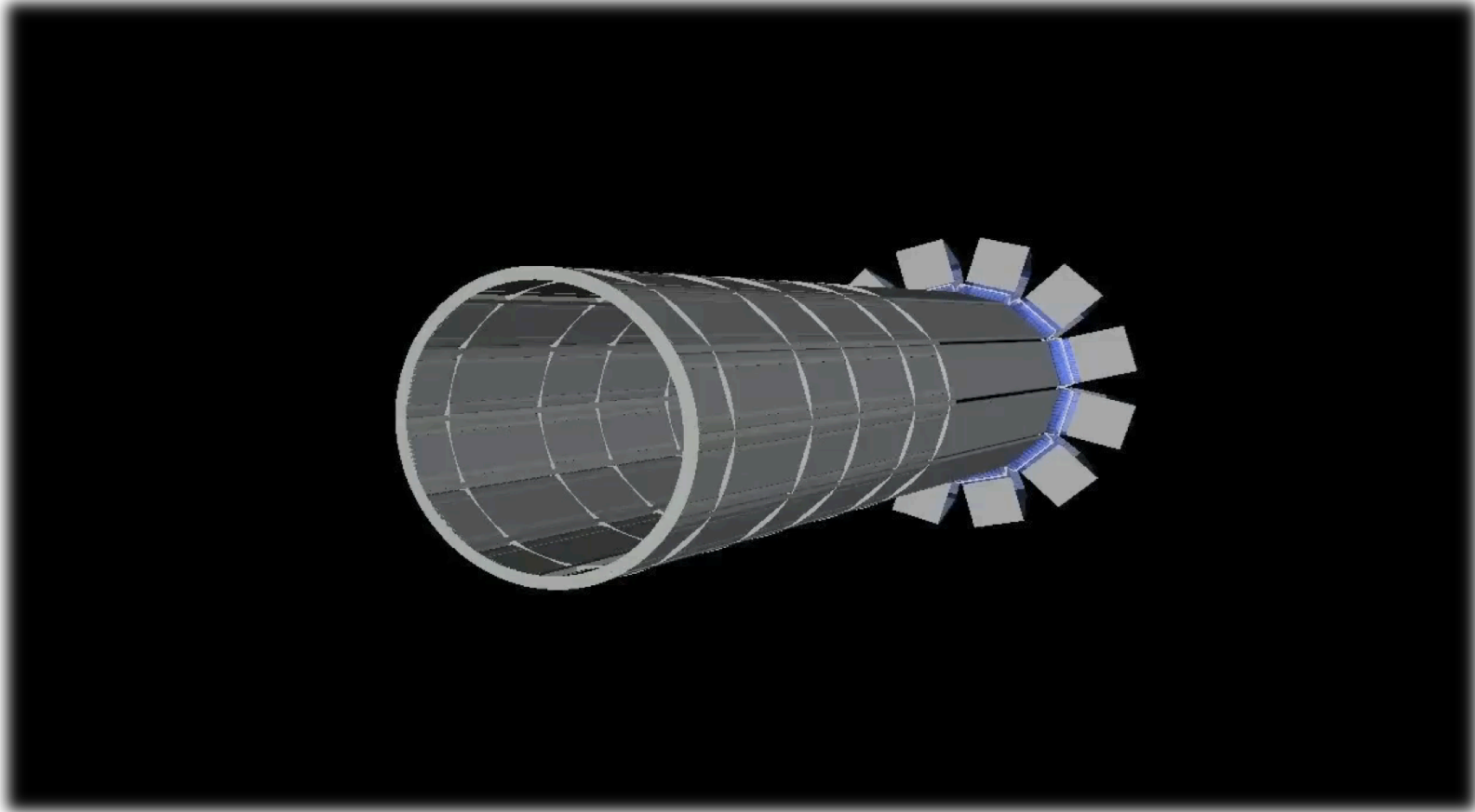
History

- We developed a full GEANT4 model the Focusing DIRC design
- The primary goal was to study resolution performance and provide feedback into the design process
- This is an optically capable model, i.e. it tracks Cerenkov photons, deals with interfaces between different materials (like glue and quartz bars), bounces photons off mirrors, etc.
- With this model in place, it wasn't too much more work to put together something that could be incorporated into Bruno.
 - Needed to add all of the support material and write out a gdml file

FDIRC w/ Outer Support



FDIRC, Outer Skins Removed



Status

- The gdml file for this model has been created and was sent to Eugenio. Should be part of Bruno already.
- In order for it to be used as an optical model and not just a chunk of material, two things need to happen:
 - Need to turn on the Cerenkov process
 - Could be costly in terms of CPU time
 - Need to be able to specify the optical properties of materials
- The existing GEANT4-gdml conversion doesn't handle optical properties of materials correctly. We need to be able to specify an index of refraction that is a function of wavelength, for example. Same issue for optical absorption.
- So current Bruno model just has “normal” materials
- I submitted a bug report to the GEANT folks and was told that this will be fixed in the next set of patches to 4.9.3

Plans

- We would like to be able to study the effects of backgrounds in the FDIRC using Bruno.
- I can see two possible paths
 1. Turn on Cerenkov process in Bruno and either:
 - a) Wait for the patch to GEANT 4.9.3 or
 - b) Put the material description in C++ instead of gdml
 2. Just write out list of all charged particles that enter any quartz material and then run stand-alone FDIRC simulation
- Path 2. is probably the easiest, but 1. would be the cleanest
 - Would be nice to be able to turn Cerenkov process on even if just as an option in Bruno
 - Not exactly sure what the CPU cost would be.
 - Can be sped up by throwing PMT quantum efficiency in early, for example. Only have to track <20% of the optical photons