ATHENA Software and Studies - next steps

- Jets, HQ, EW, and BSM “golden channels” put forward regularly, e.g. https://indico.bnl.gov/event/12508/

Golden channels
(candidates)

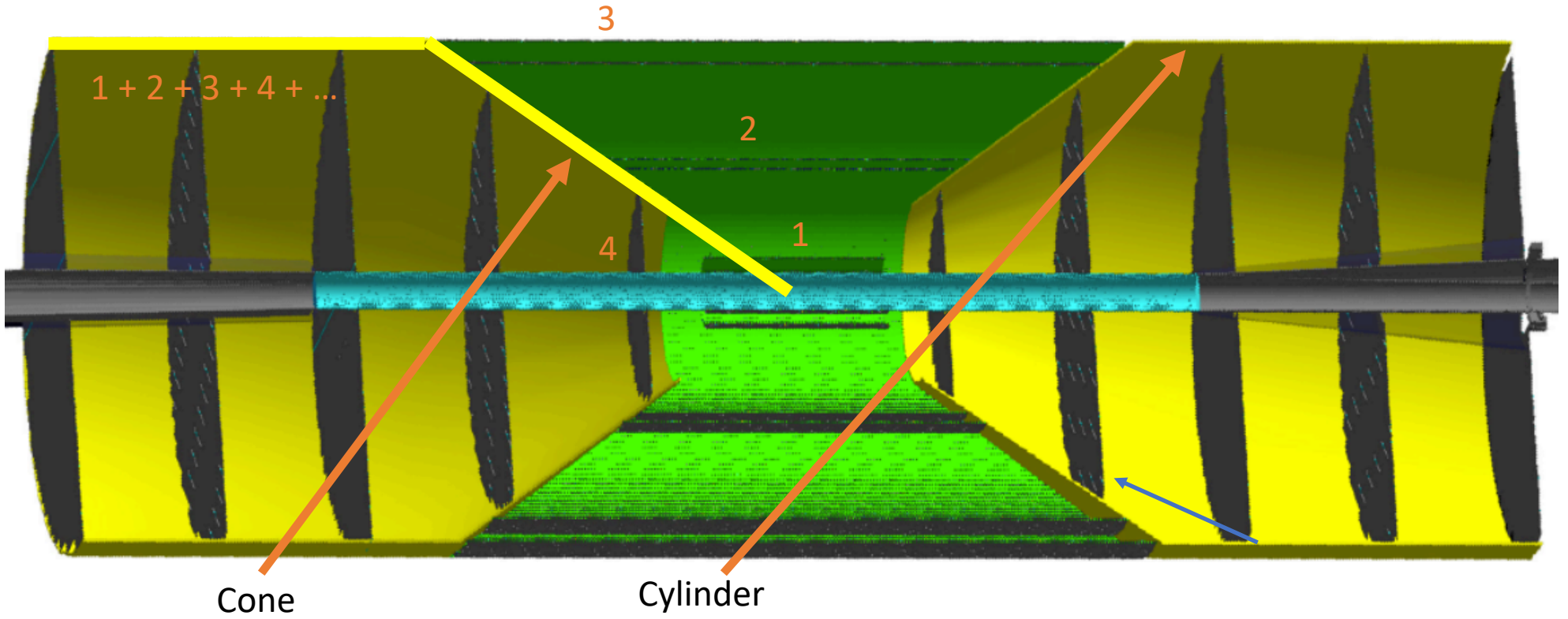
These represent four classes of measurements. So, we will pick representatives ones, aiming at emphasizing ATHENA unique features such as

- Bigger barrel
  (i.e superior PID, better calo, better energy-flow)
- Stronger field
  (i.e. better tracking, better energy-flow)

- **Heavy-flavour channels**
  - F_2^c
  - A_{LL} heavy quark
  - charm meson and charm-jet R_{eA}.
- **Lepton-jet and dijet correlations:**
  - quark-Sivers and gluon-Sivers [DIS]
  - low-x, Wigner function [diffractive DIS]
  - ΔG, photon structure [photo-production, DIS]
  - Cold-nuclear matter [(n)DIS]
- **Jet substructure and event-shapes**
  - Hadron-in-jet Collins [DIS].
  - Hadronization studies with angularities, correlation
- **Electroweak/BSM**
  - EW Structure functions [CC DIS].

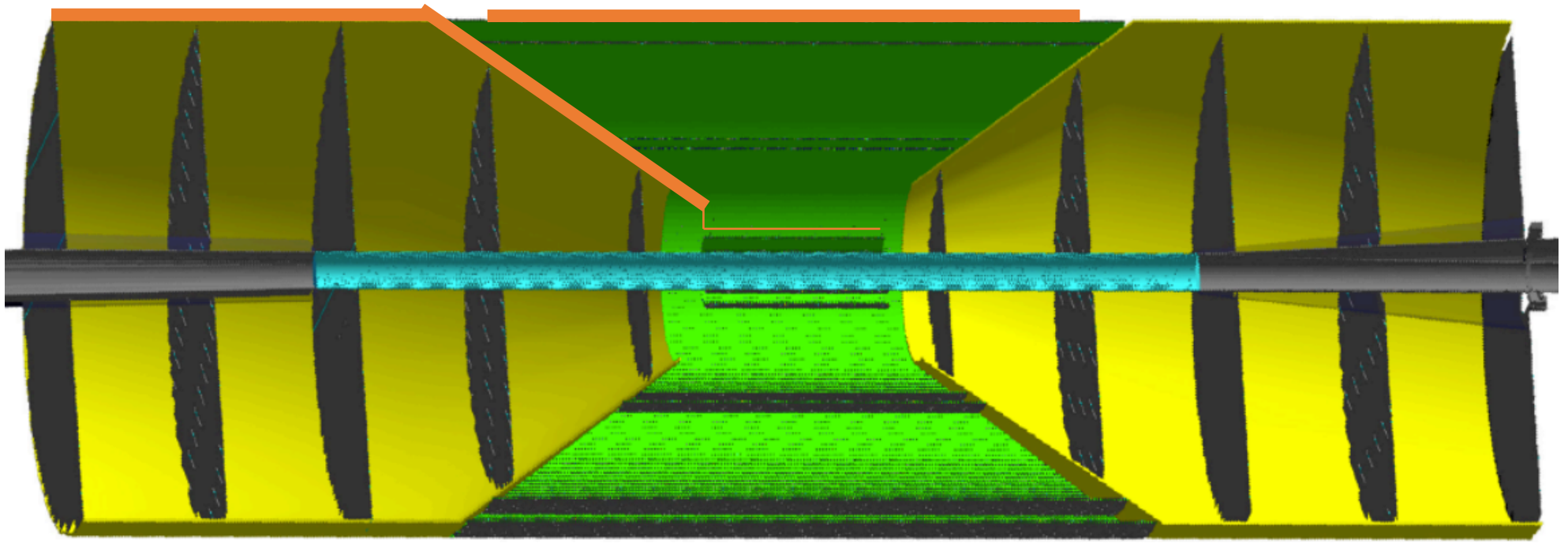
ATHENA Software and Studies - next steps

- Baseline all-silicon software geometry agreed on last week
- Simplified combination of services and mechanics included
- Implementation and validation in progress



ATHENA Software and Studies - next steps

- 10um pixelation throughout; 40um silicon thickness; Leo's parametrization for the aluminum conductors
- Basic carbon support structure, albeit without flanges; disk-like interface to vertexing layers



ATHENA Software and Studies - next steps

- ACTS is implemented; a proof-of-concept has been shown for mid-central rapidities,
- As a group, how do we want to proceed?
  - Tracking performance – updated GEANT-based simulations and parametrizations,
  - Fast simulation implementations – Delphes, other
  - Analysis chain(s) for GEANT-based simulation
    - ATHENA tutorial at recent SIDIS WG mtg, c.f. https://indico.bnl.gov/event/12604/
    - Baseline PYTHIA samples (being) defined,
  - Simulations for the proposal
    - Combination of fast-simulations and GEANT-based simulations, ATHENA software stack?
    - F_2 charm, charm double ratio in e+A vs e+N, (di-jet broadening), …
    - Golden channels or plots are those that exist.