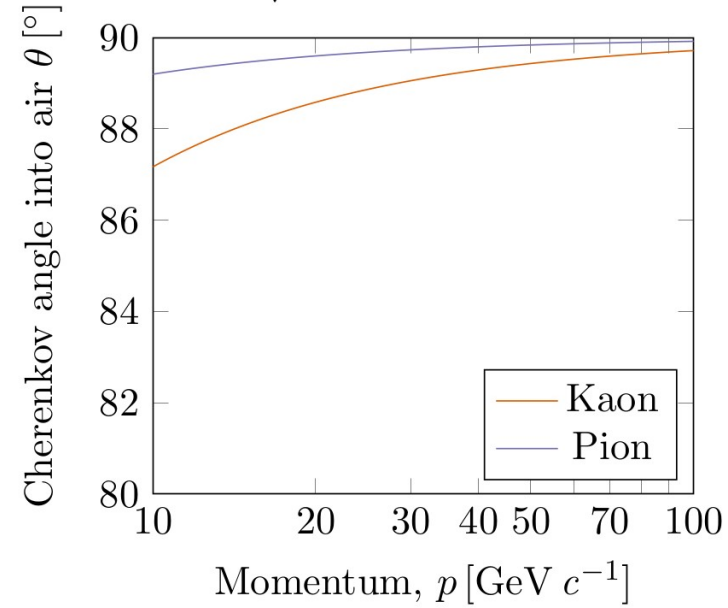


# Novel radiators

- Develop new materials with tunable properties (e.g. ref index)
  - Can change bulk material properties
  - Can introduce new interference effects with very different properties
- In this proposal start small
  - Make modification of bulk material (avoids potential issues with low photon yields and high dispersions)
  - Tune the refractive index to  $\sqrt{2}$
  - Gives huge angular separations between particle across wide momentum range
  - Requires very different geometries to existing detectors
  - Requires different reconstruction



# Novel radiators

- Task list (non-exhaustive)
  - Material tests: radiation hardness, mechanical stability, optical quality, gas absorption, manufacture QA, etc
  - Mechanical coupling to material given large angle acceptance and material dimensions
  - Simulation studies of the new geometries and optics
  - Optimisation of photon detector characteristics required (plane size, pixel size, wavelength ranges, etc)
  - Proof-of-concept reconstruction in plausible applications
- This would easily occupy one funded RA, plus non negligible commitment of CG resources from a couple of groups

# Novel radiators

- Link/collaboration with UK industry
  - Short term: materials are manufacturable with standard techniques by several UK manufactures
  - Long term: will develop links (maybe CASE students) on manufacturing more complex structures at scale
- Shared interest of the proposed work among other UK institutions
  - Beyond Imperial, informal interests have been expressed by academics at Bristol, Edinburgh and RAL
  - (both HEP and CM communities)
- List of beneficiaries
  - Benefits to HEP, but also any use of particle detection (beam monitoring rad therapy/mu tomography)
  - Robust and light materials → space based applications, e.g. solar wind monitoring
  - CMT groups (new classes of material excitations to explore)
- The importance for this R&D to be considered now (instead of next year)
  - Currently still time to make an impact on the next round of LHC detector upgrades