



R&D on Novel Inorganic Scintillators for Future HEP Calorimeters

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R&D On-going at Caltech



Fast/ultrafast, radiation hard and cost-effective heavy scintillators

Bright, fast and radiation hard inorganic scintillators for the severe radiation environment expected by the proposed FCC_{hh}. YAG, LuAG, GGAG, GYAG and GLuAG suffer from slow scintillation component.

Ultrafast inorganic scintillators: Cross-luminescence. Wide gap semiconductor-based scintillators with sub-ns decay time and quantum confinement-based inorganic CsPbX₃ (X = Cl, Br, I, mixed Cl/Br and Br/I), halide perovskite quantum dots may help to break the ps timing barrier for future HEP TOF.

Dense, UV-transparent, cost-effective heavy inorganic scintillators for the homogeneous hadron calorimeter (HHCAL) concept for the Higgs factory.

Compact UV sensitive photodetectors with sufficient dynamic range for ultrafast calorimeters.

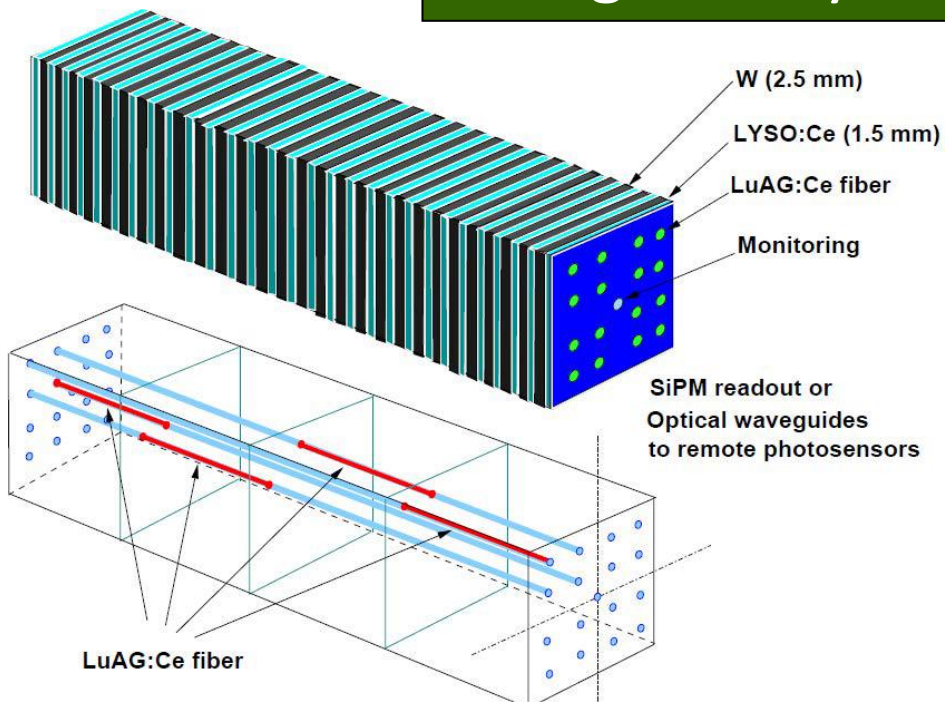
Collaboration with labs and industry is crucial



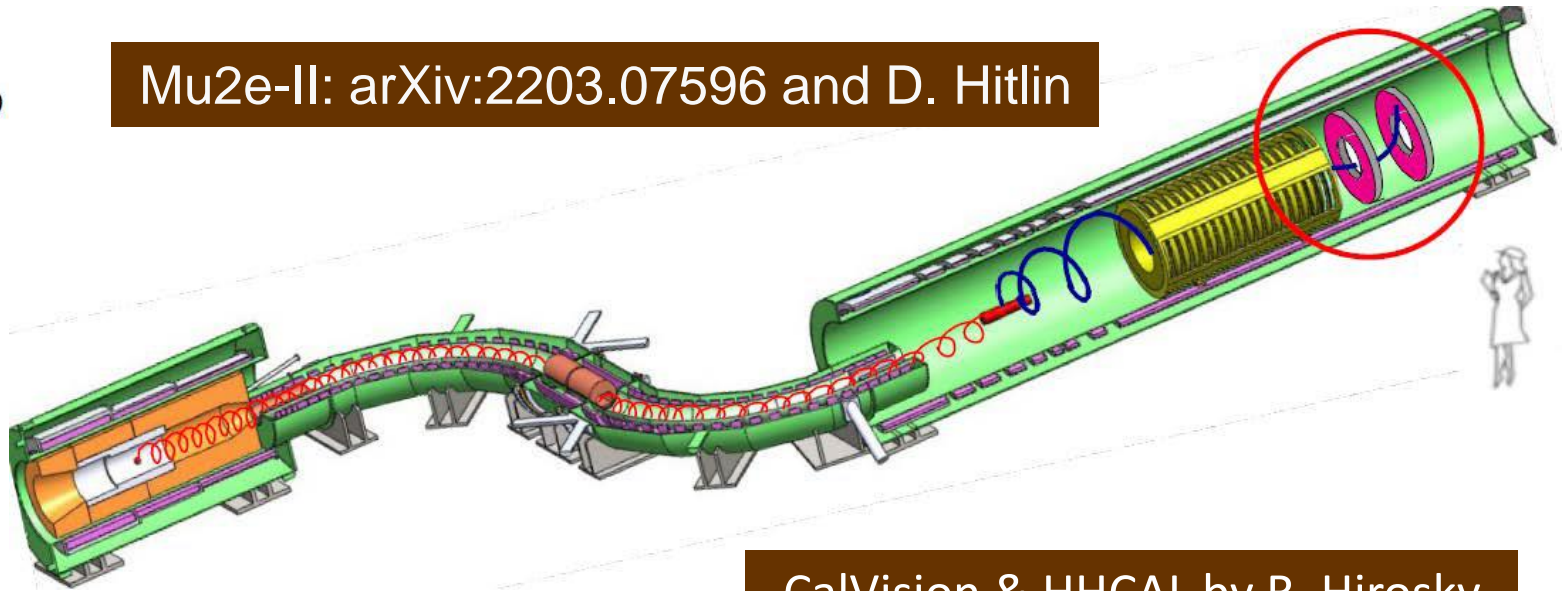
Calorimeter Concepts in Workshop



Inorganic crystal/ceramic/glass scintillators are used

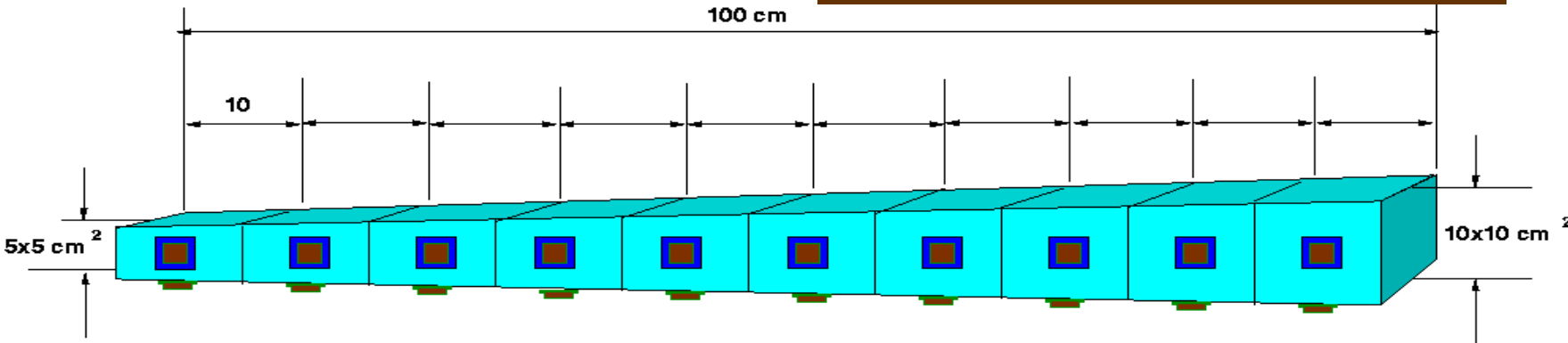


Mu2e-II: arXiv:2203.07596 and D. Hitlin



CalVision & HHCAL by R. Hirosky

RADiCAL by J. Wetzel





Novel Inorganic Scintillators



Inorganic ceramic and glass scintillators by industry

Radiation Hard LuAG:Ce ceramic fiber of $\Phi 0.6 \times 120 \text{ mm}^3$

Ultrafast Lu₂O₃:Yb ceramics of 9.4 g/cc

Cost-effective ABS Glass of 6 g/cc

