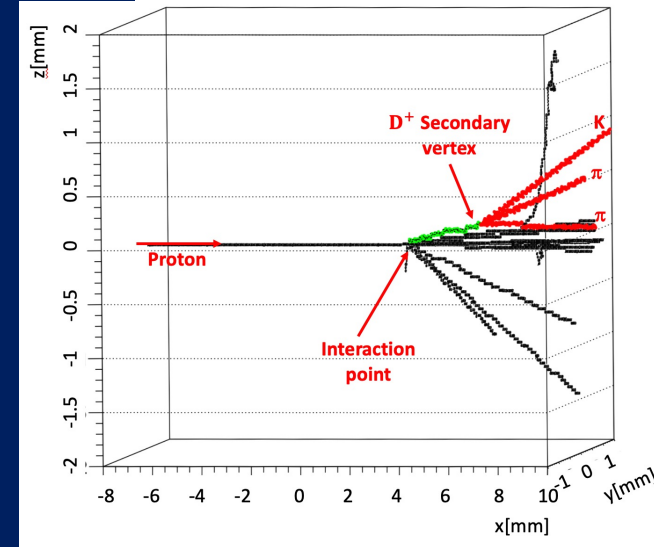
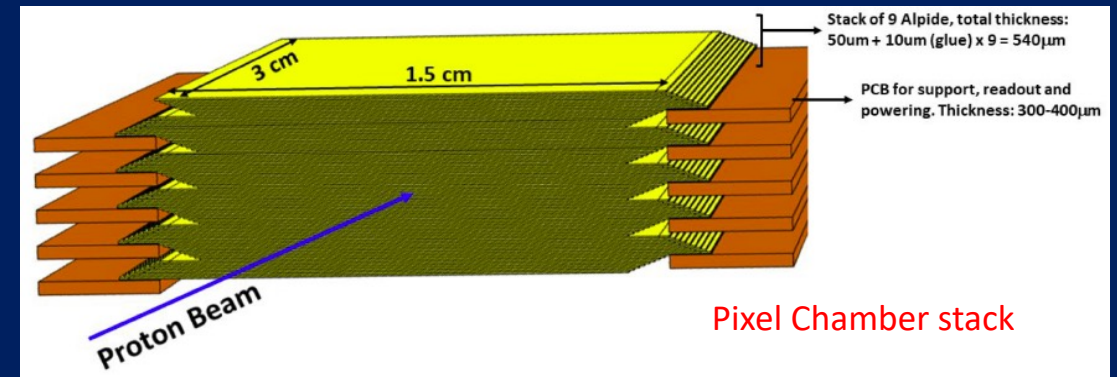


Pixel Chamber: a solid-state active-target for 3D imaging of charm and beauty

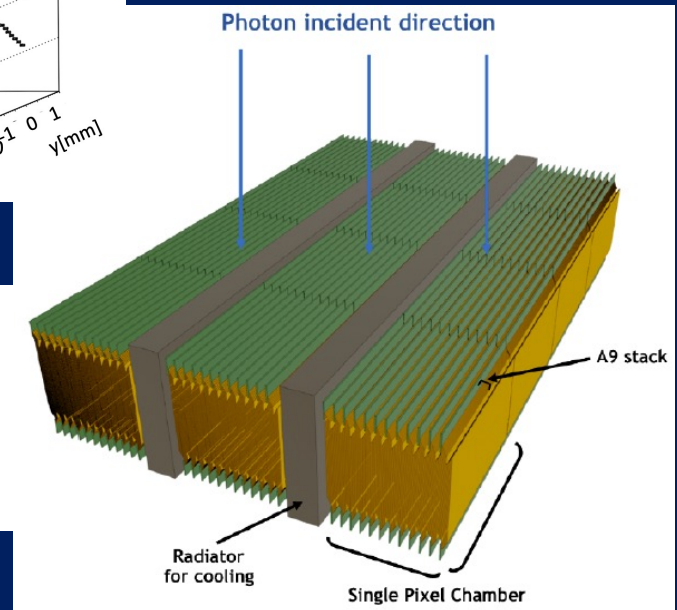
A. Mulliri, M. Arba, P. Bhattacharya, E. Casula, C. Cicalò, A. De Falco, F. Fionda, M. Mager, D. Marras, A. Masoni, L. Musa, S. Siddhanta, M. Tuveri, G. Usai

Pixel Chamber is conceived to be the **first bubble chamber-like high-granularity active target** based on silicon pixel sensors, capable to perform **continuous, high-resolution ($O(\mu\text{m})$) three-dimensional tracking**.

- Pixel Chamber will be a stack of 216 ALPIDE sensors: a matrix of $\sim 10^8$ pixels
 - R&D towards prototypes construction is ongoing. The **first stack of 3 APLPIDE has been produced**
- Numerical simulations were developed and validated in laboratory to **study cooling solutions**
- **High precision reconstruction of proton-silicon interactions** performed with tracking and vertexing algorithms specifically developed for Pixel Chamber
- Applications and future developments:
 - Pixel Chamber used as fixed target coupled to a silicon telescope: **Charm and beauty cross section measurement at CERN SPS**
 - Pixel Chamber used as scatterer in a Compton camera: the precision of the gamma source position measured with a Compton camera is determined by the number of gammas detected. Pixel Chamber has the potential to reconstruct recoiled electrons tracks with very high precision → **can reduce the number of gamma required for the reconstruction** → applications in astrophysics and for fast online imaging in hadron therapy
 - development of the **first three-dimensional stack with large area monolithic pixel sensors** ever built using large area (stitched) monolithic pixel sensors



Proton-silicon interaction inside Pixel Chamber



Assembly of multiple Pixel Chambers to obtain a Compton camera scatterer