

The background of the slide is a grayscale, high-magnification microscopic image of a detector component. It shows a complex assembly of metal parts, including a cylindrical component with horizontal ridges, various bolts, and a cable with a braided shield. The lighting creates strong highlights and shadows, emphasizing the metallic textures and the precision of the engineering.

Measurements of scintillation in fluorocarbons



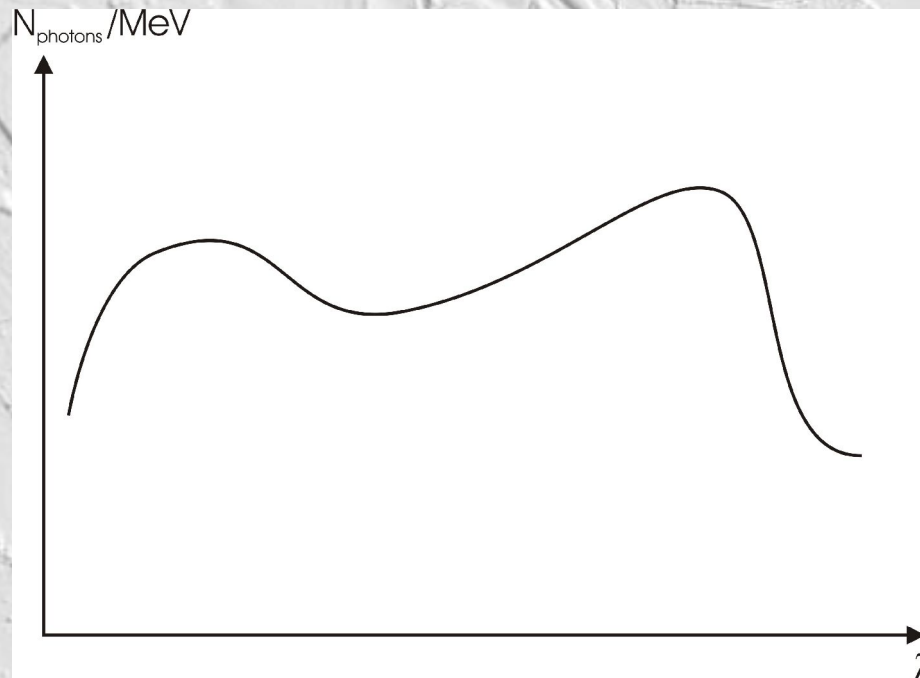
Outline

- Project outline [what]
- Motivation [why]
- Simulation/Experiment [how]
 - Work accomplished?
 - What to do next?

Project outline

- Measurement of the scintillation light in different fluorocarbons (gases) as function of the wavelength per energy

Which basically means:



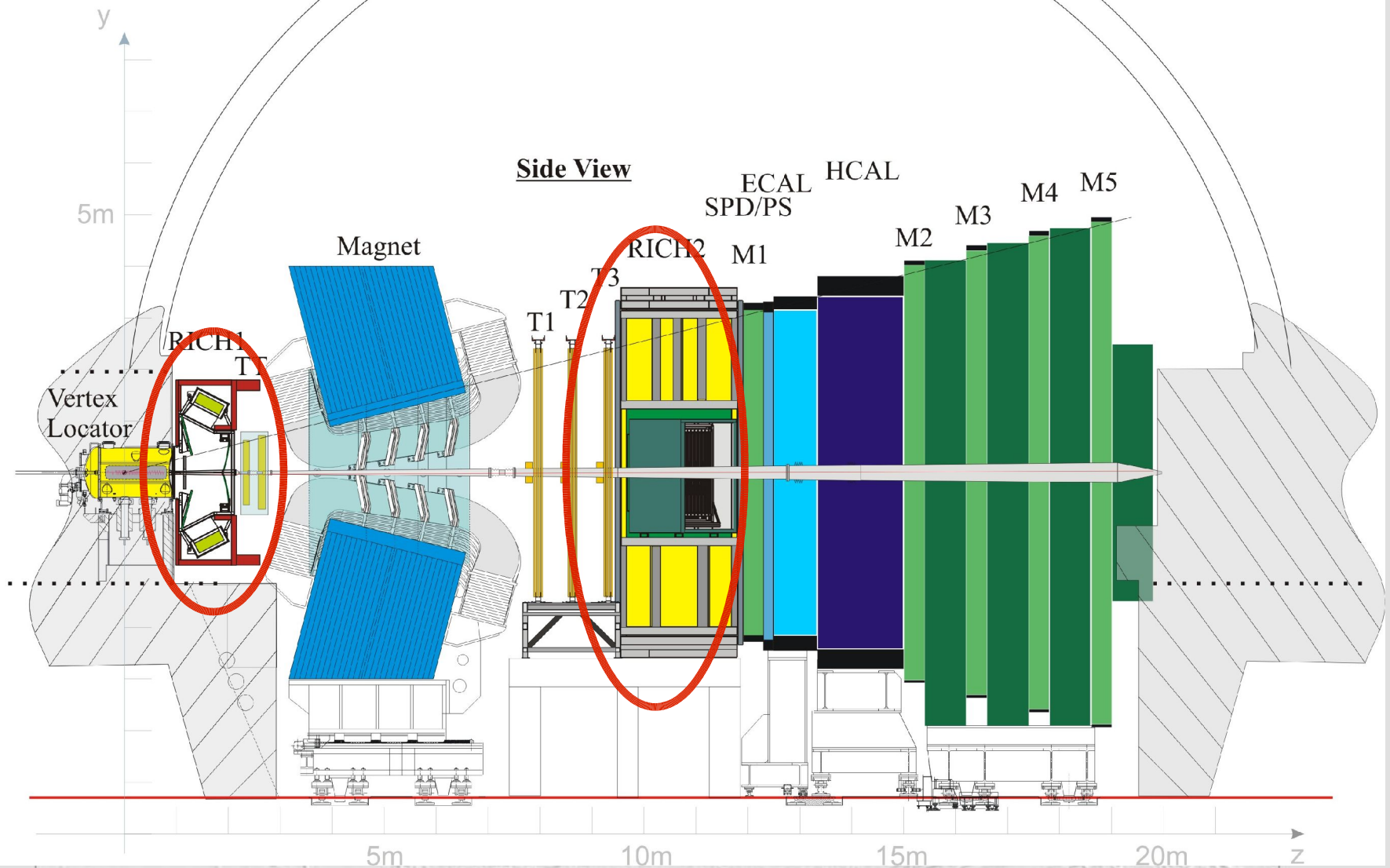
for various gases:

Ar, CF_4 , C_4F_{10} ,

C_6F_{12} , etc.

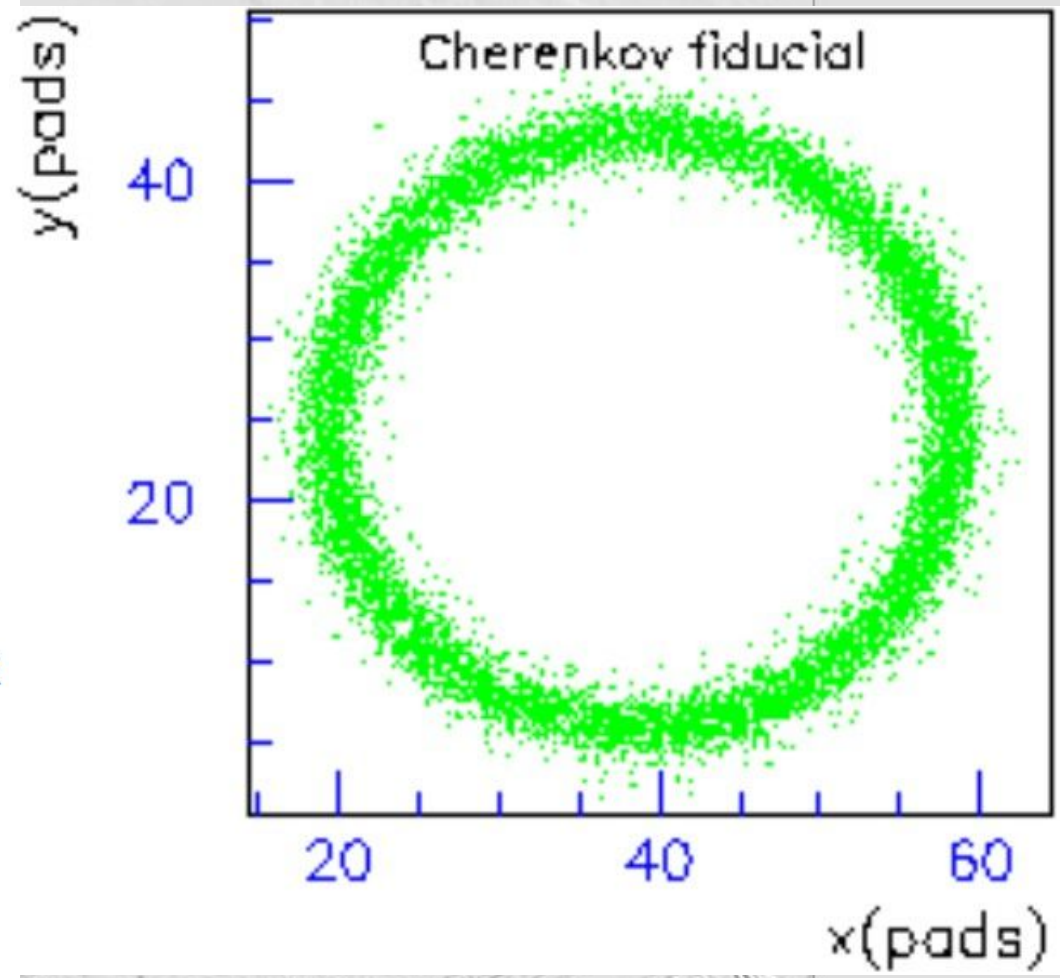
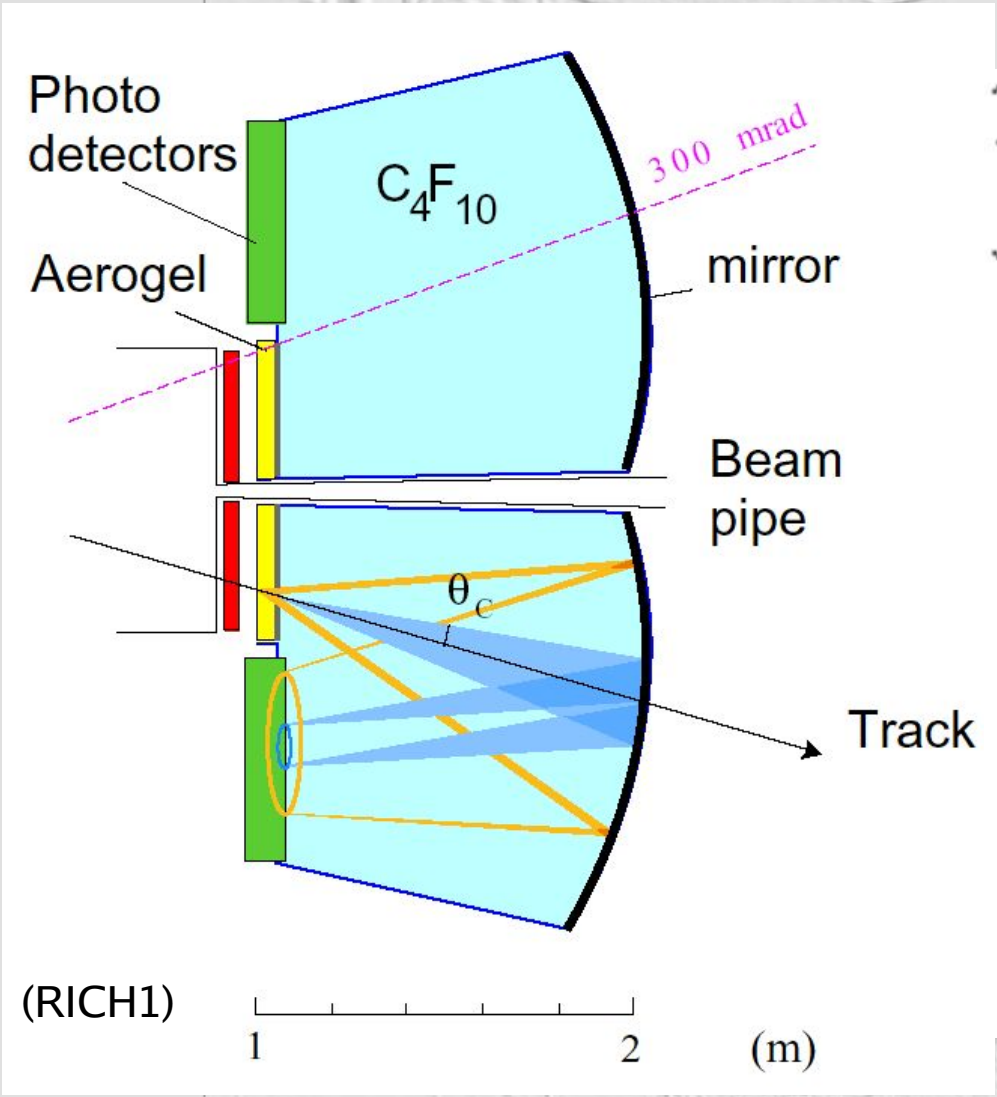
Motivation

- The LCHb project uses 2 RICH detectors for measurement of velocity i.e. particle identification



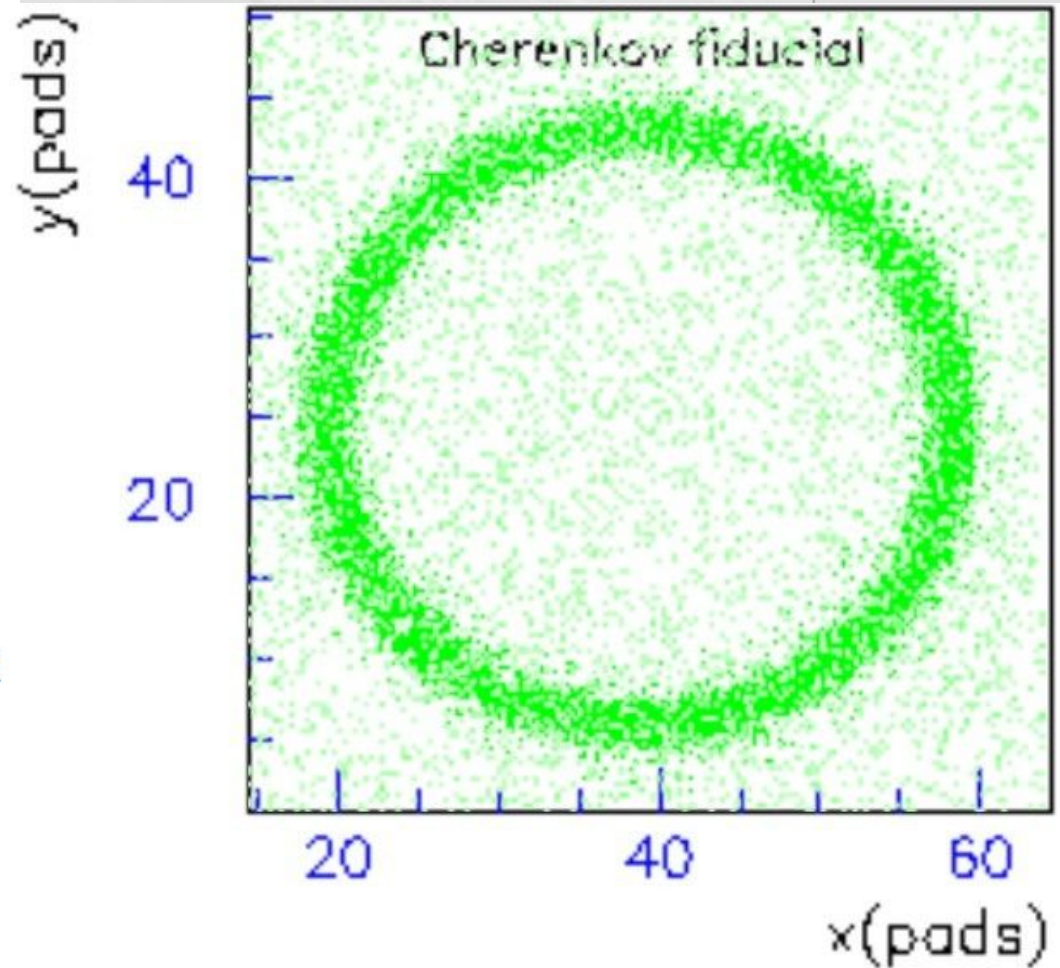
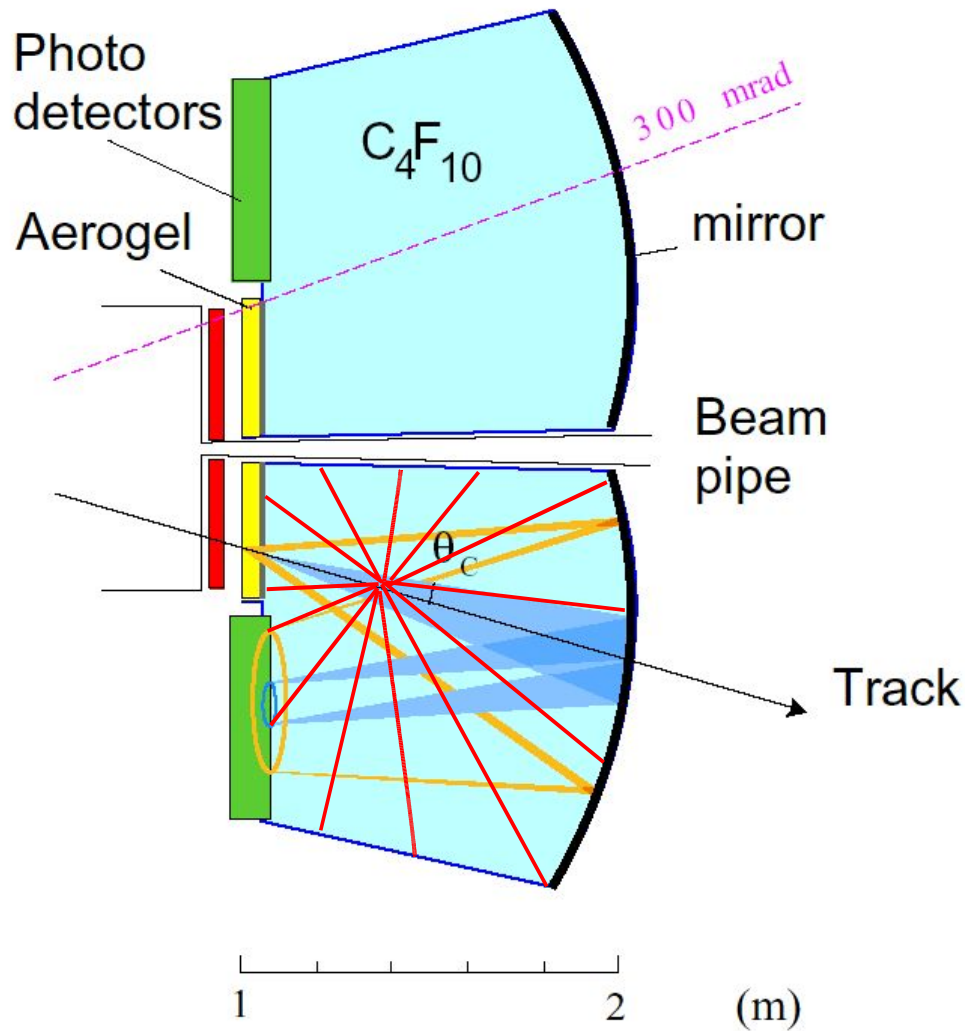
RICH

- The particles in the RICH produce Cherenkov light (“shockwave”)



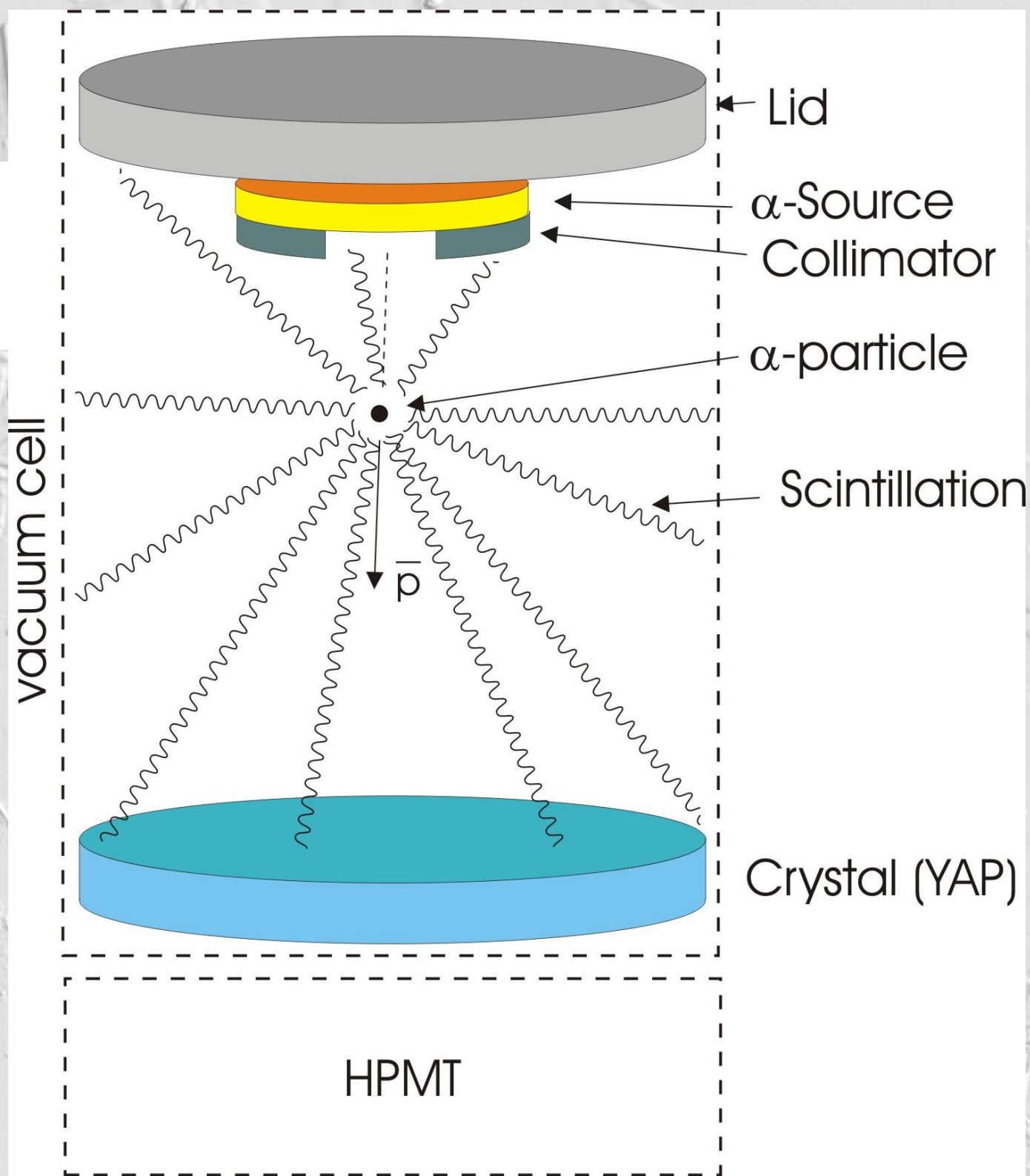
RICH

- The particles in the RICH produce Cherenkov light (“shockwave”) - and in addition scintillation light





Principles



[how]

Simulation

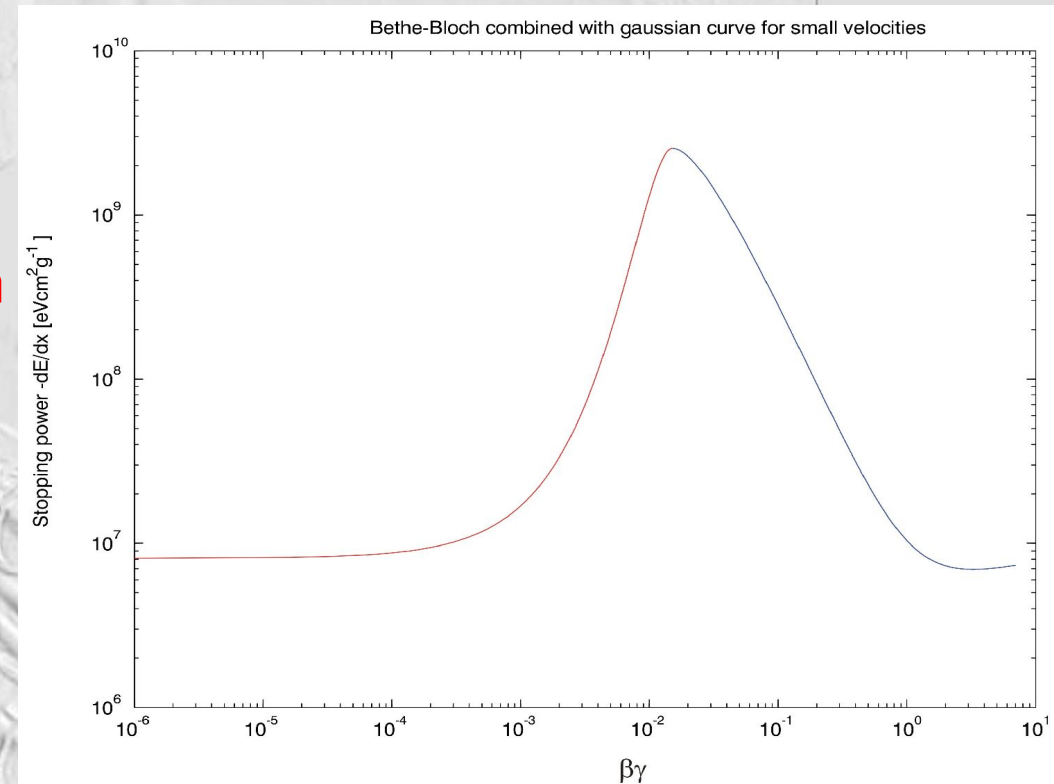
- One step:

- Energy \rightarrow velocity (β) & momentum (p)
- Stopping power calculated from Bethe-Bloch combined with a constructed Gaussian curve
- Energy loss and step length calculated
- Multiple scattering calculated (new position of AP)
- Isotropic emission of a photon
- Determine if the photon hits the crystal and if it enters the HPMT
- Emission energy versus measured energy ratio calculated
- Determine if AP should die

Simulation

- One step:

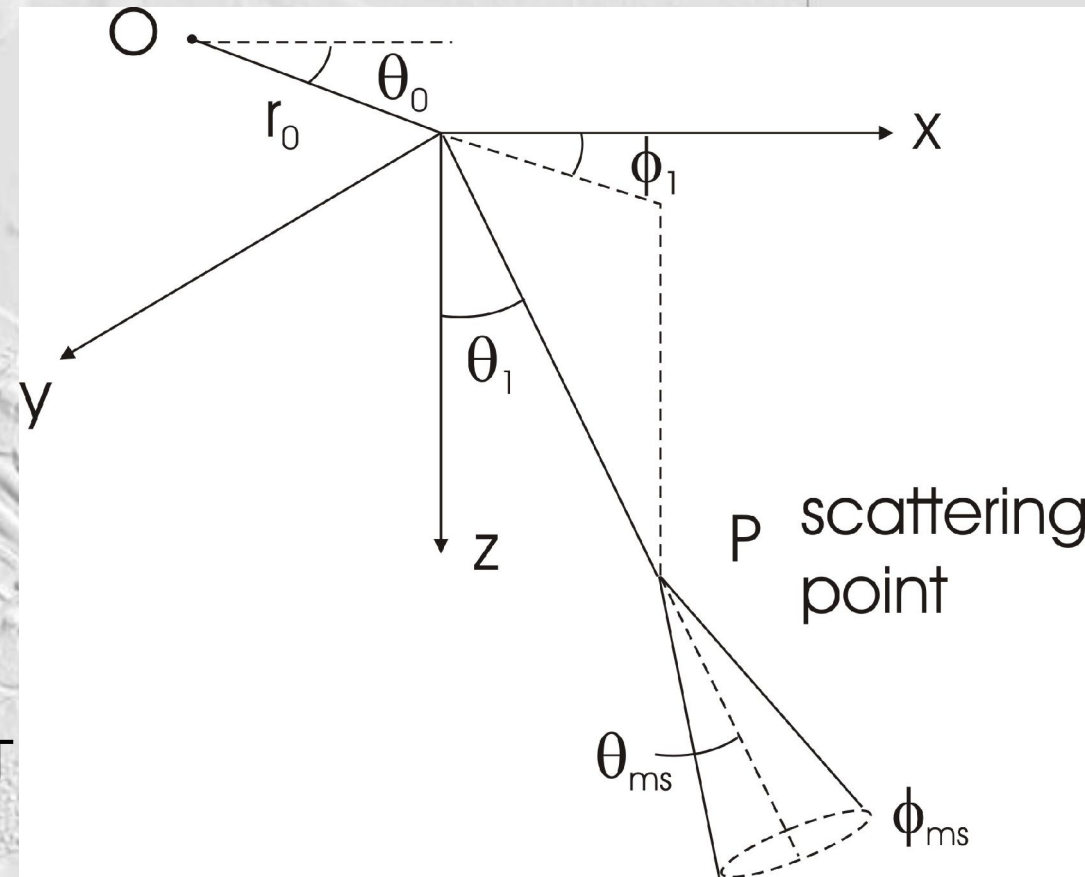
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Simulation

- One step:

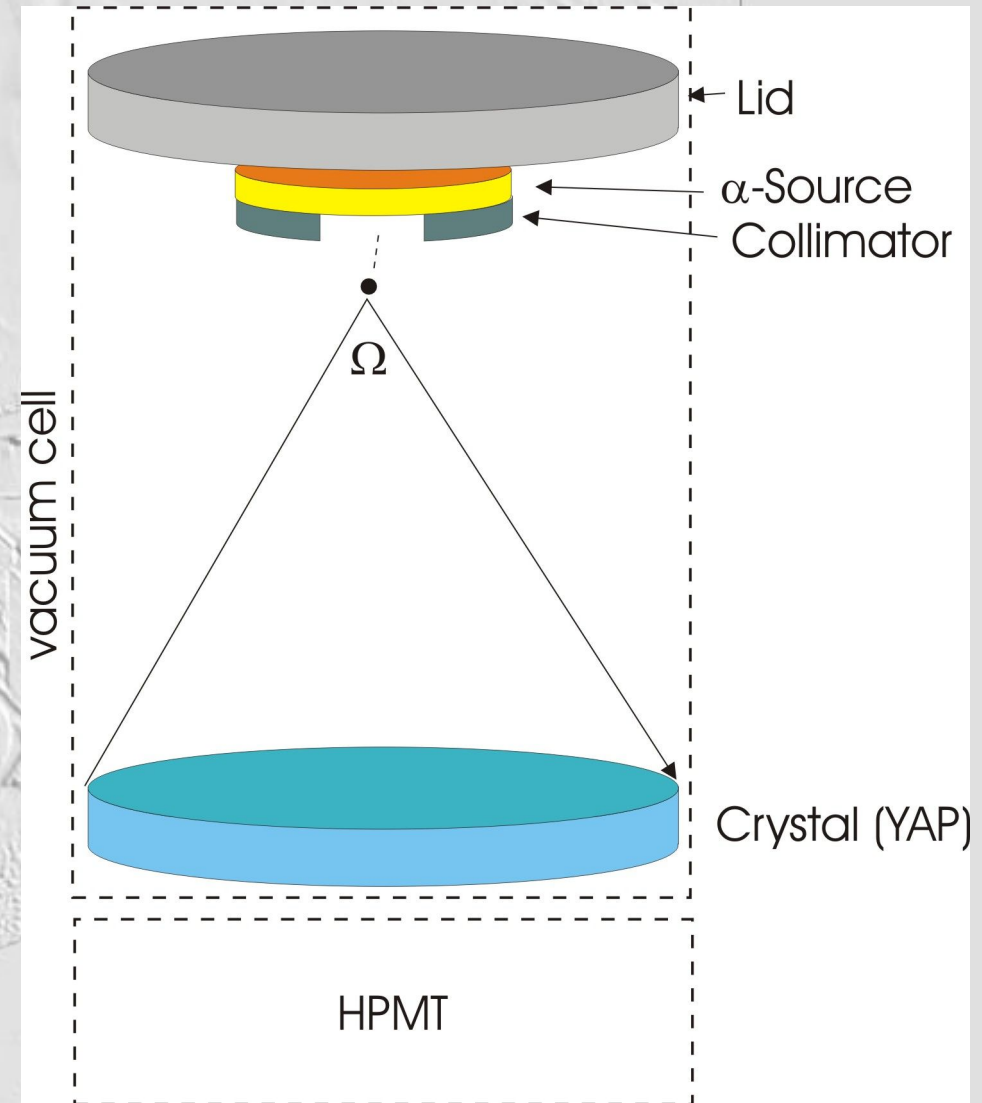
- Energy \rightarrow velocity (β) & momentum (p)
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Simulation

- One step:

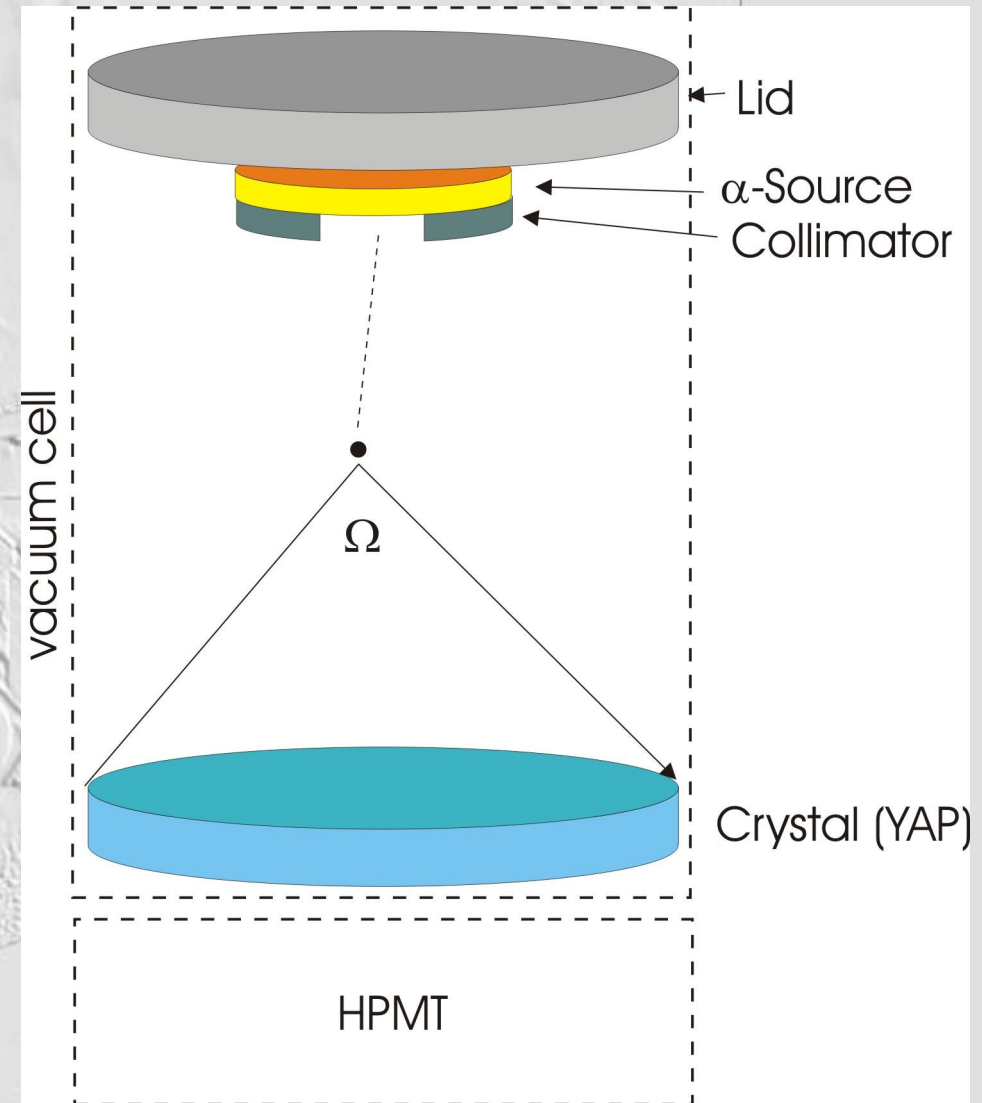
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Simulation

- One step:

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Surely this
is a long
step..?

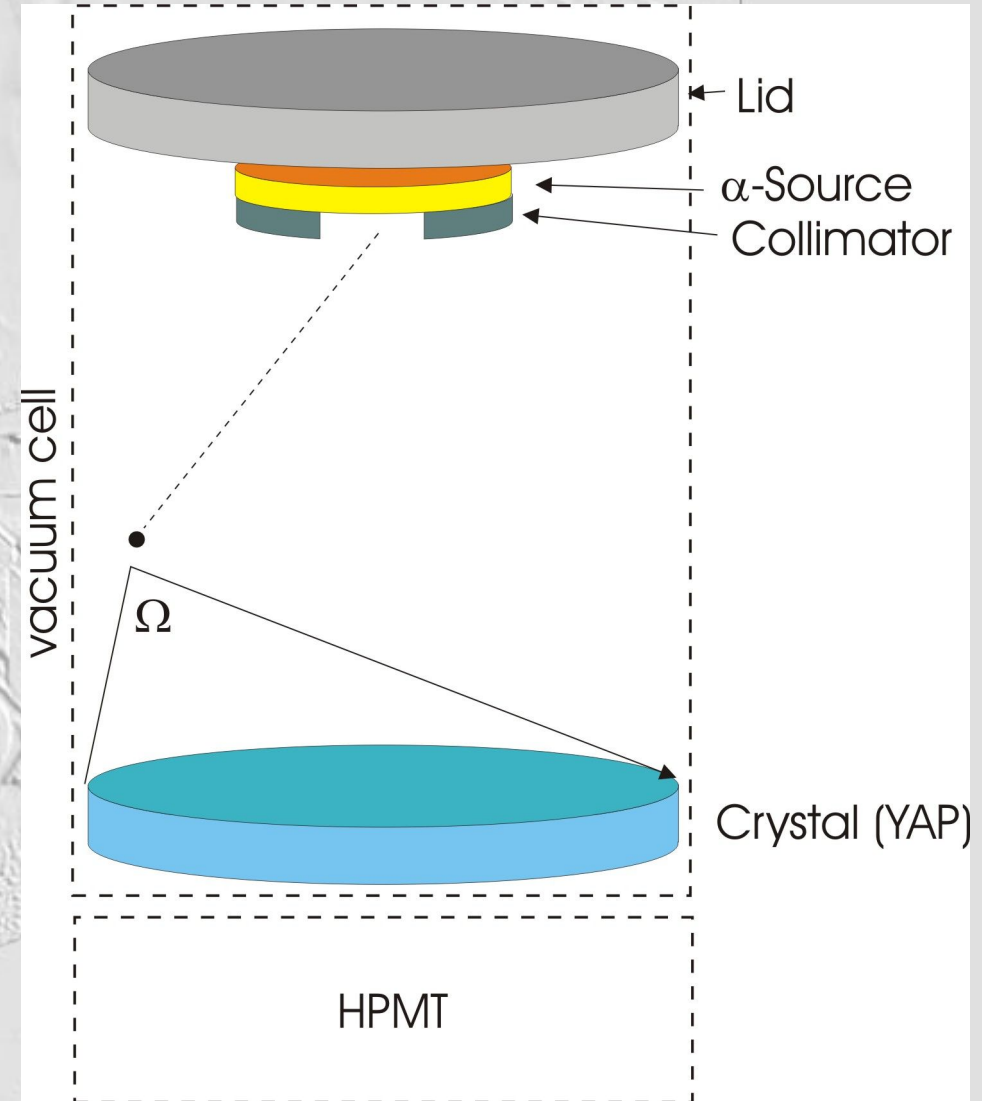


[how]

Simulation

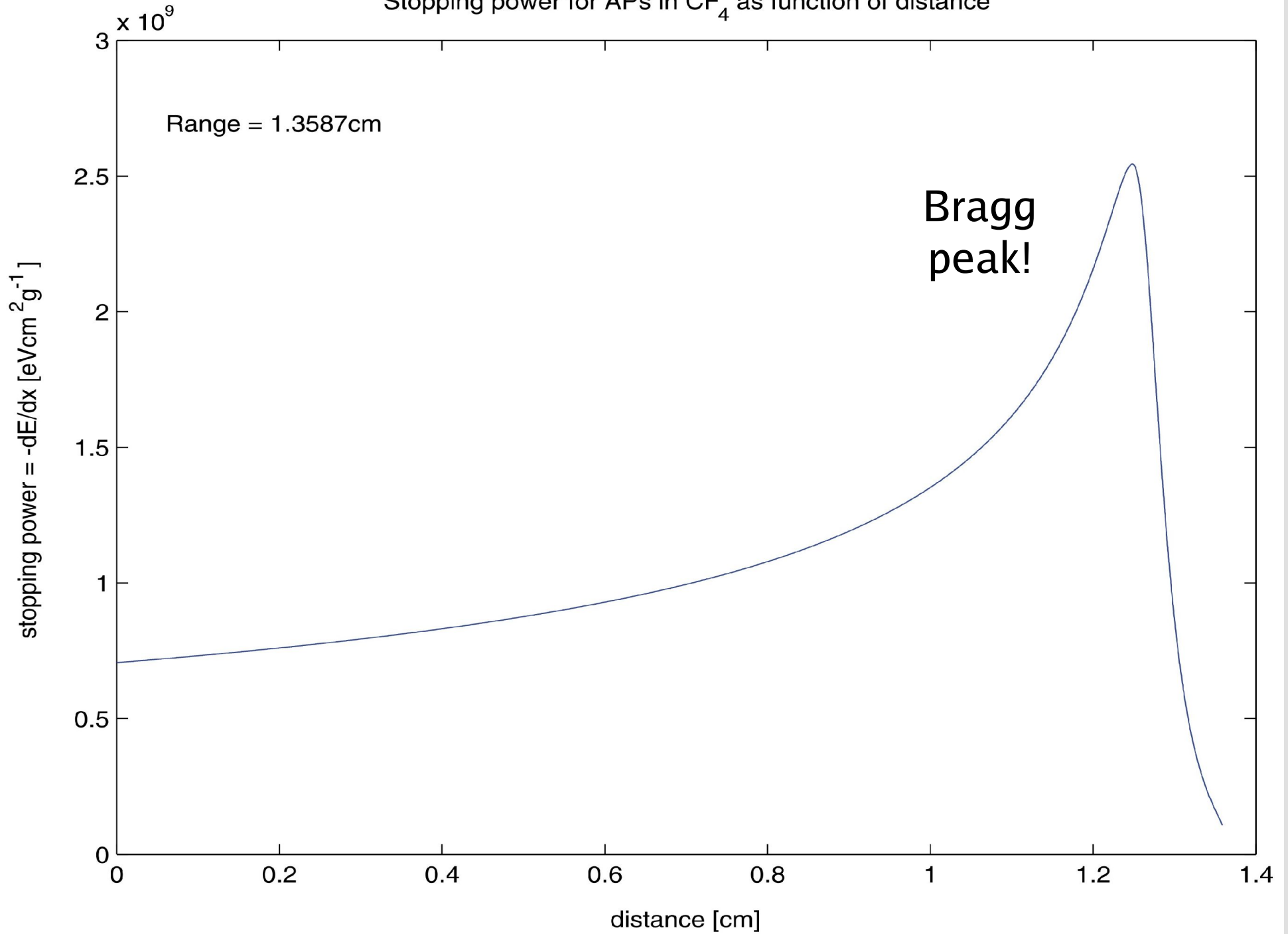
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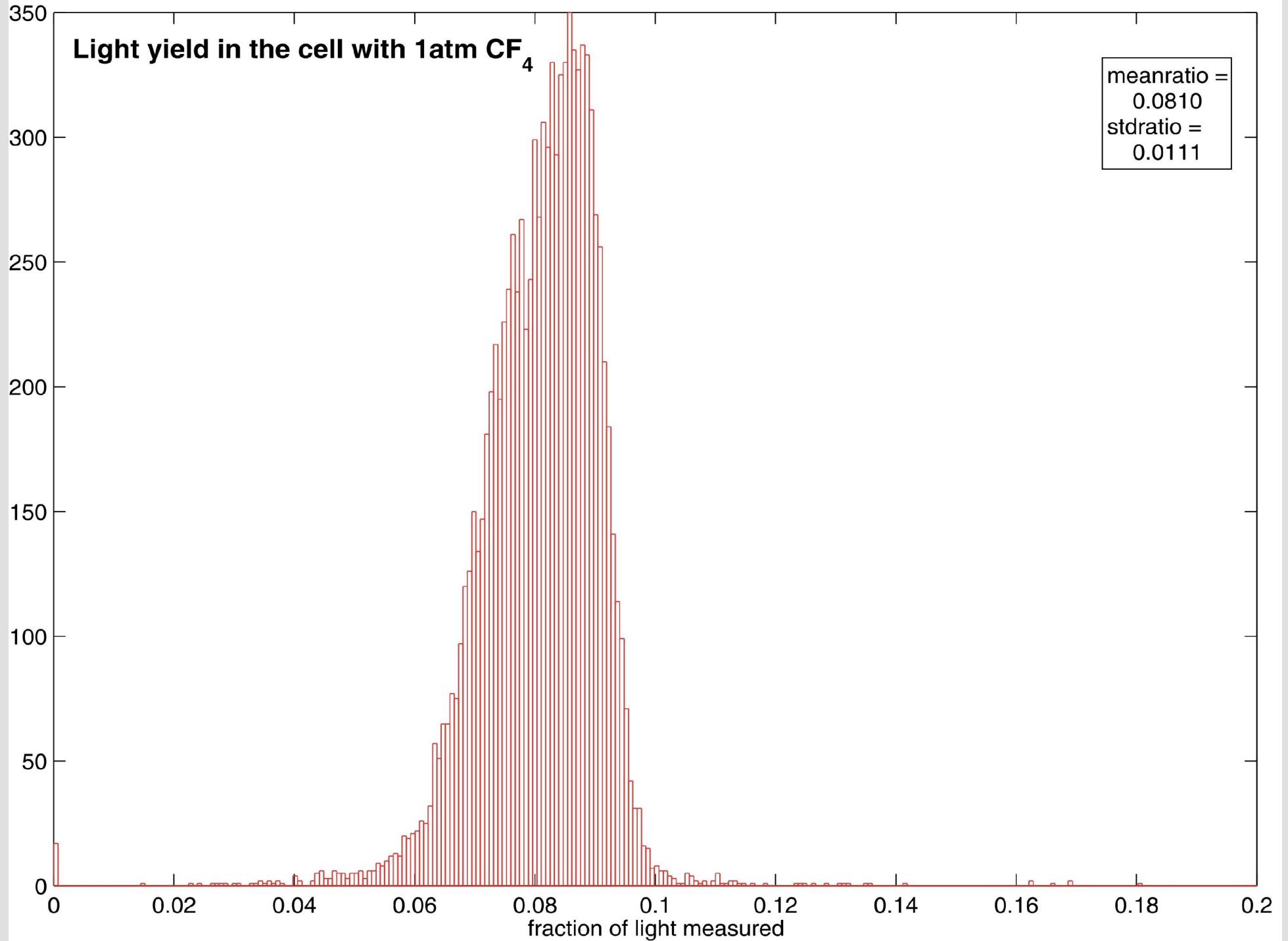


Simulation Results

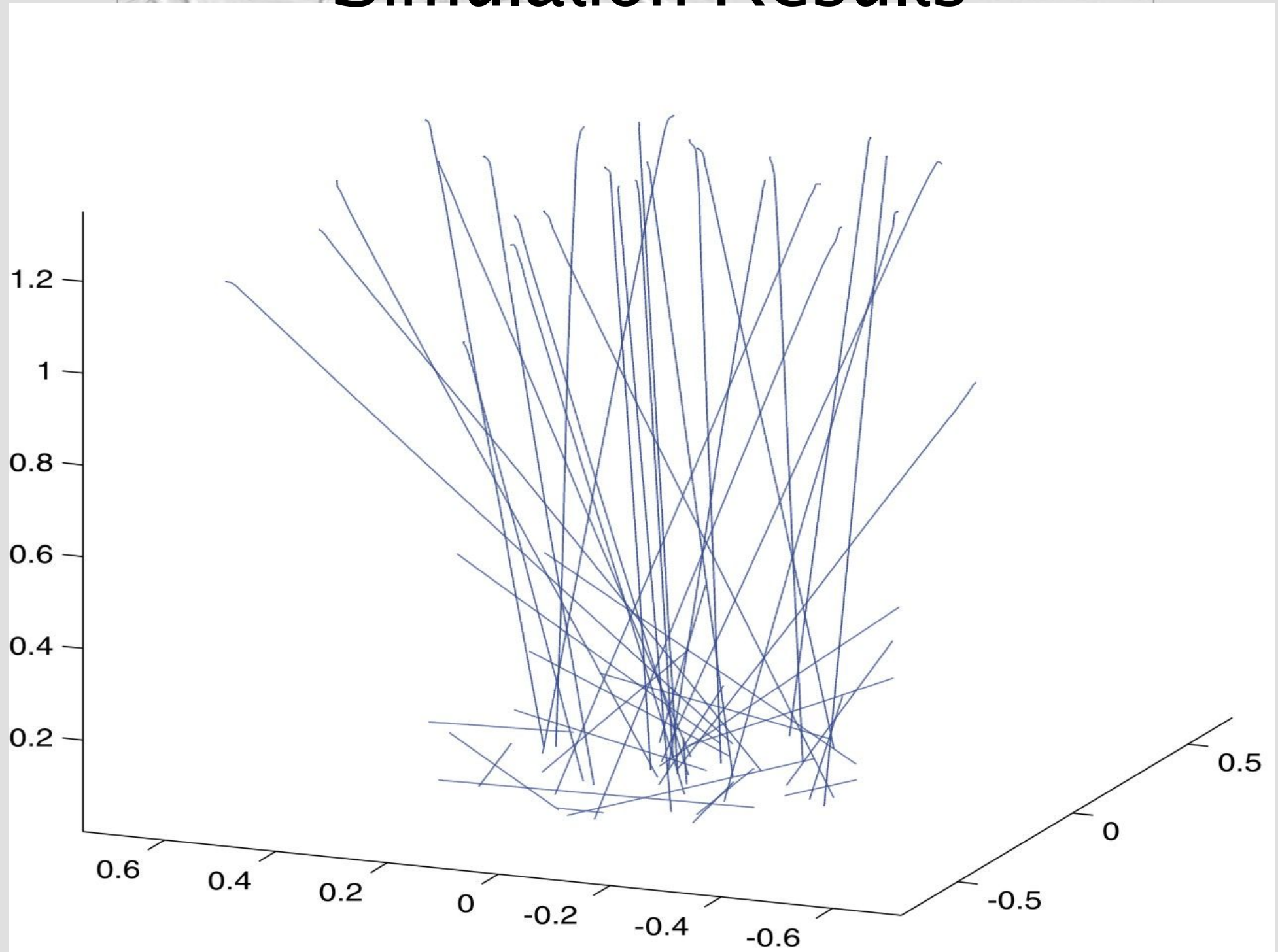
Stopping power for APs in CF_4 as function of distance



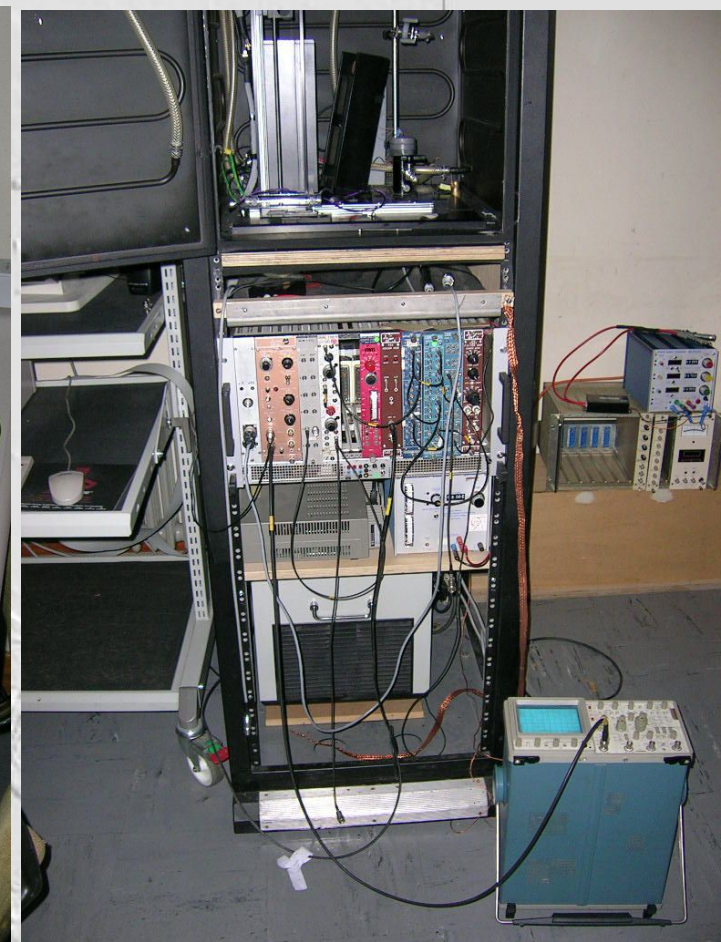
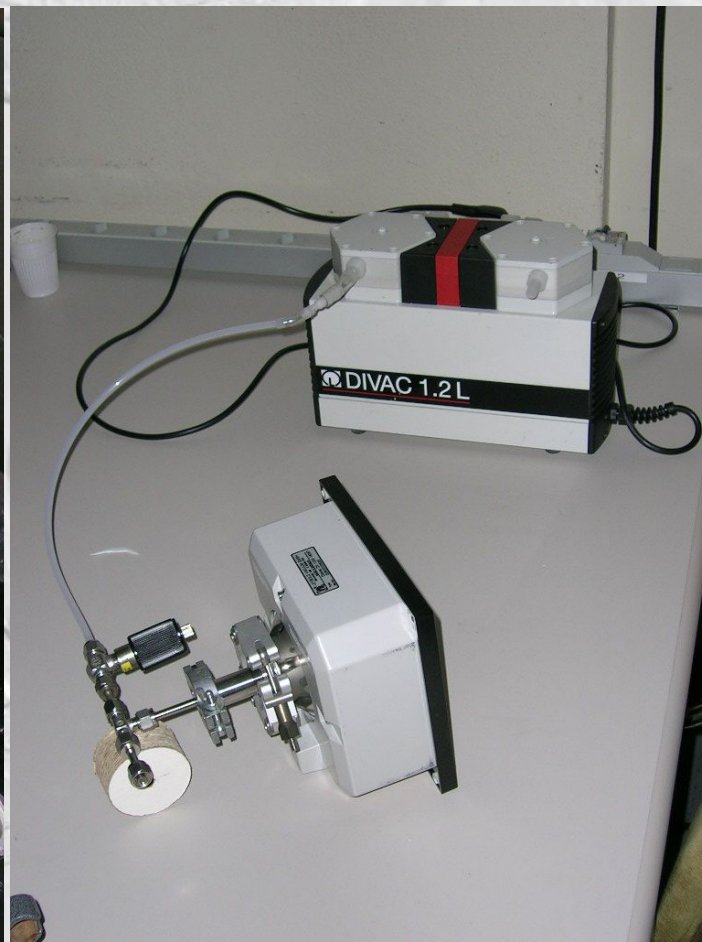
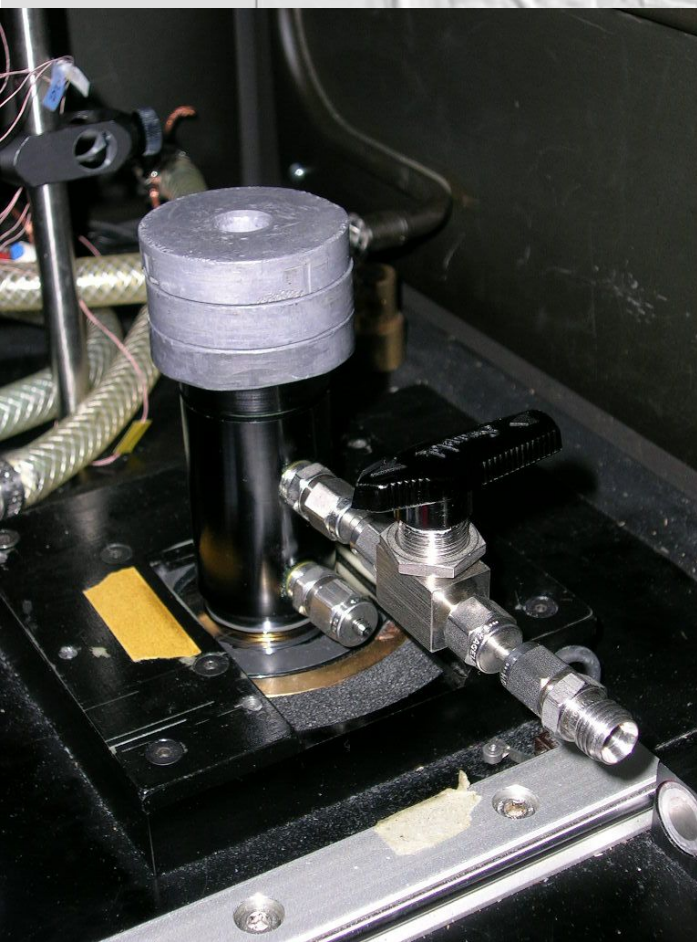
Simulation Results



Simulation Results



Setup

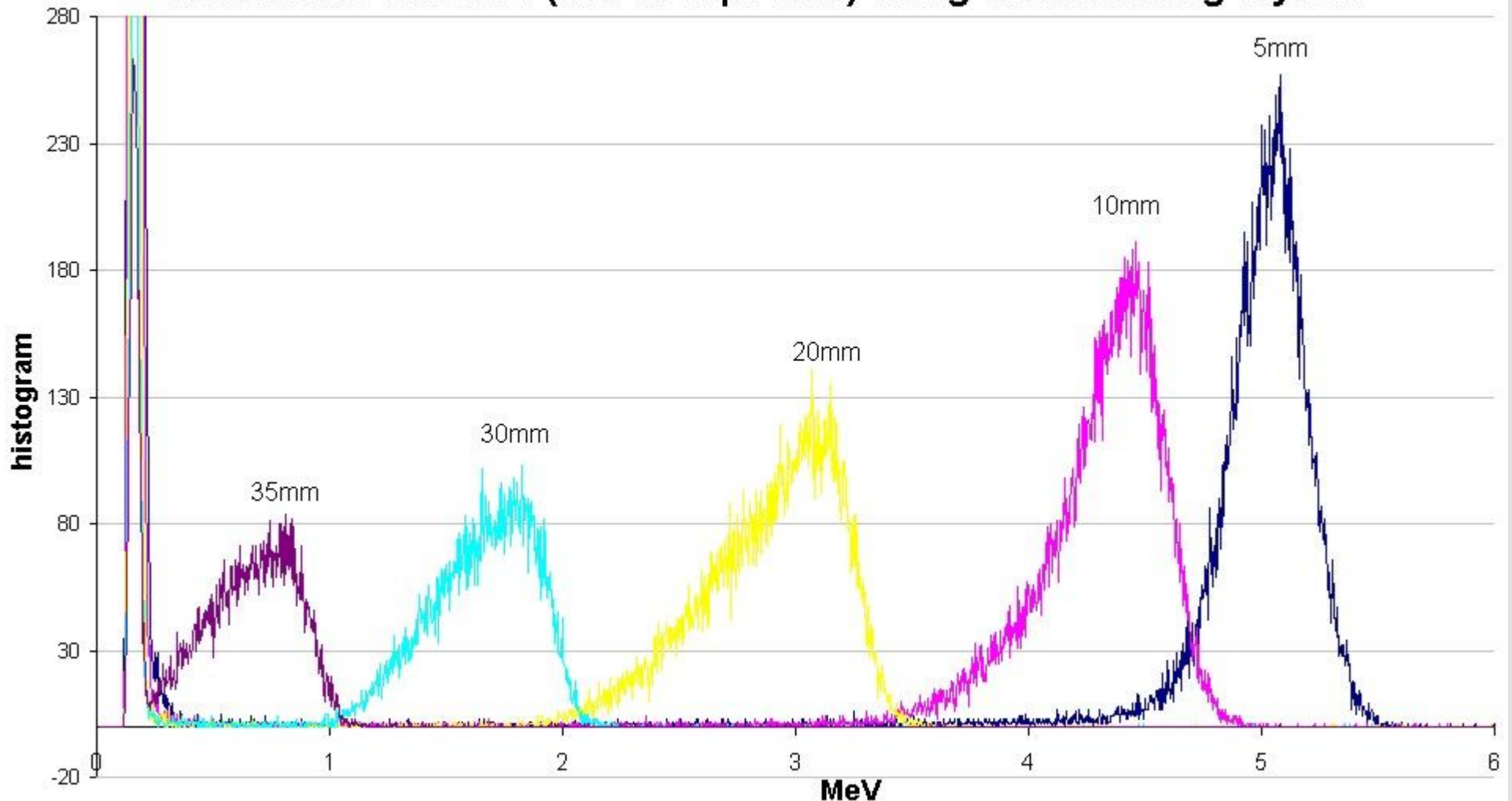


Work accomplished

- Simulation programme and setup ready
- Done vacuum tests for several days
- Measurement of the energy of the AP
- Measurement of wavelength integrated scintillation in Ar as reference

Work accomplished

Measurement of the energy of the APs in ambient air (1atm) as function of distance (60s of exposure) using a scintillating crystal



What to do next?

- Preliminary experiments finished
 - Made simulation programme and done most of the simulations
 - Made the setup
 - Measured the energy of the APs
 - Measured the wavelength integrated photon yield of Ar
- Do the measurements!
 - First do the final wavelength integrated photon yield
 - and then as function of wavelength with a monochromator

