

Measurement of luminosity with SciFi detector at LHCb

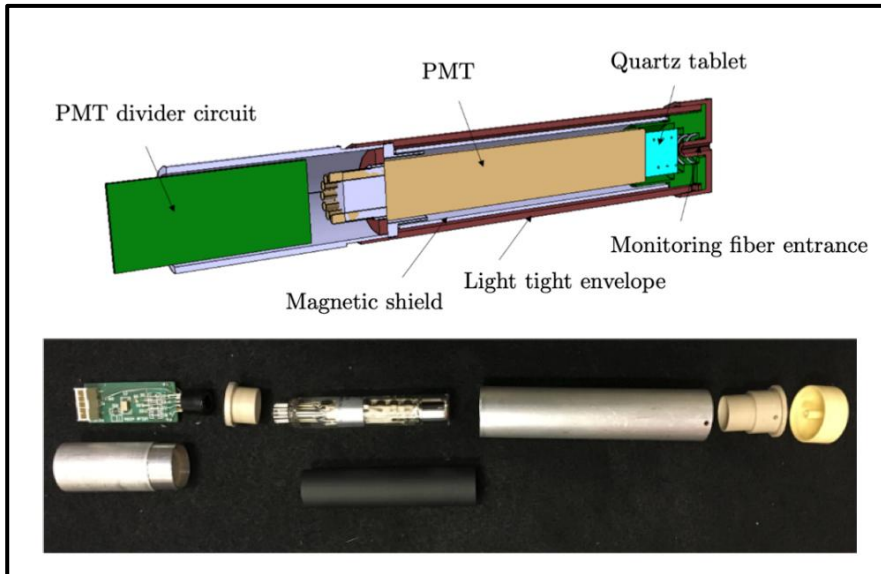
- ▶ About Luminosity
- ▶ PLUME
- ▶ Detector SciFi
- ▶ VDM scan
- ▶ Luminosity measurment

About Luminosity

► $L = N_1 N_2 f_{LHC} \Omega$

► $L = \frac{f_{LHC} \mu N_{Bunches}}{\sigma_{vis}}$

PLUME



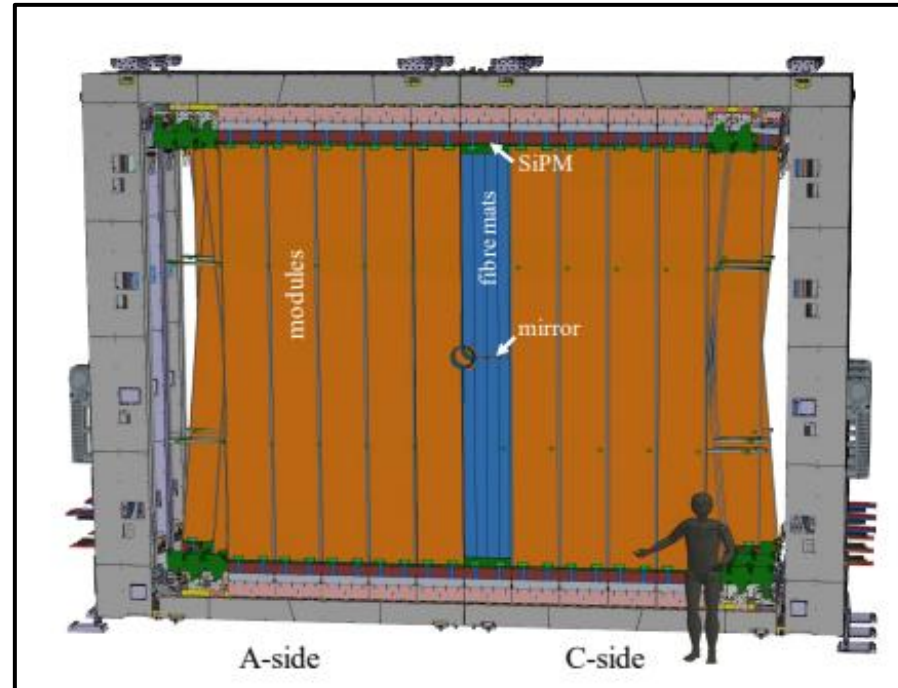
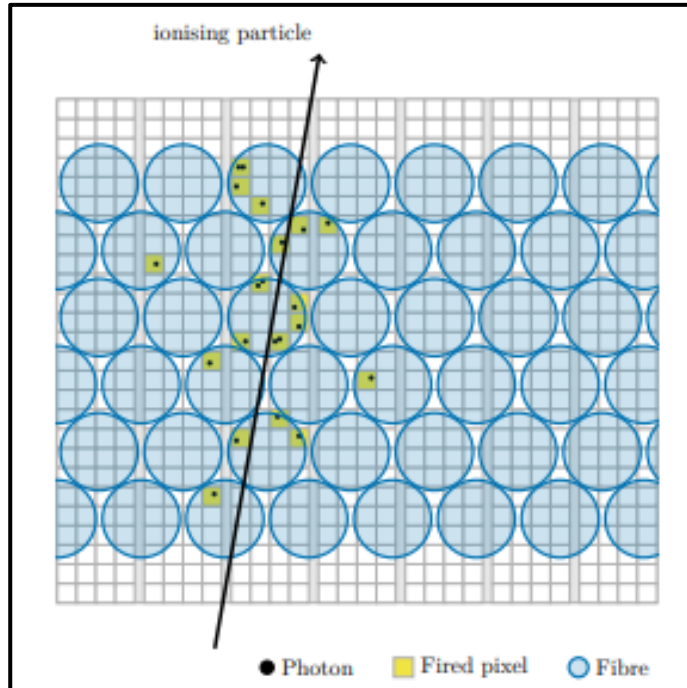
Plan of the anatomy of PLUME detector

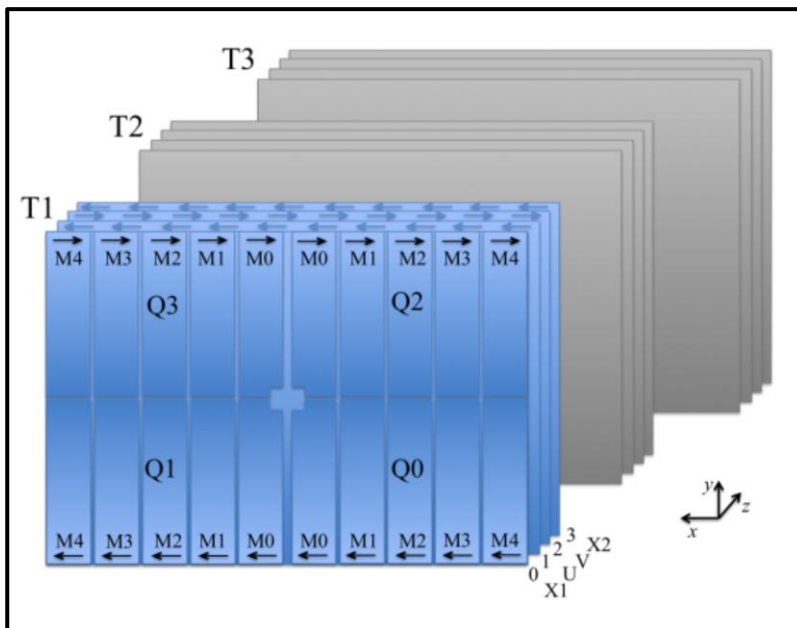
$$P(n) = \frac{\mu^n}{n!} e^{-\mu}$$

$$P(0) = e^{-\mu}$$

$$\mu = \frac{\mu_{BB} - \mu_{BE} \frac{\langle N_1^{BB} \rangle}{\langle N_1^{BE} \rangle} - \mu_{EB} \frac{\langle N_2^{BB} \rangle}{\langle N_2^{EB} \rangle} + \mu_{EE}}{\langle N_1^{BB} \times N_2^{BB} \rangle}$$

Detector SciFi



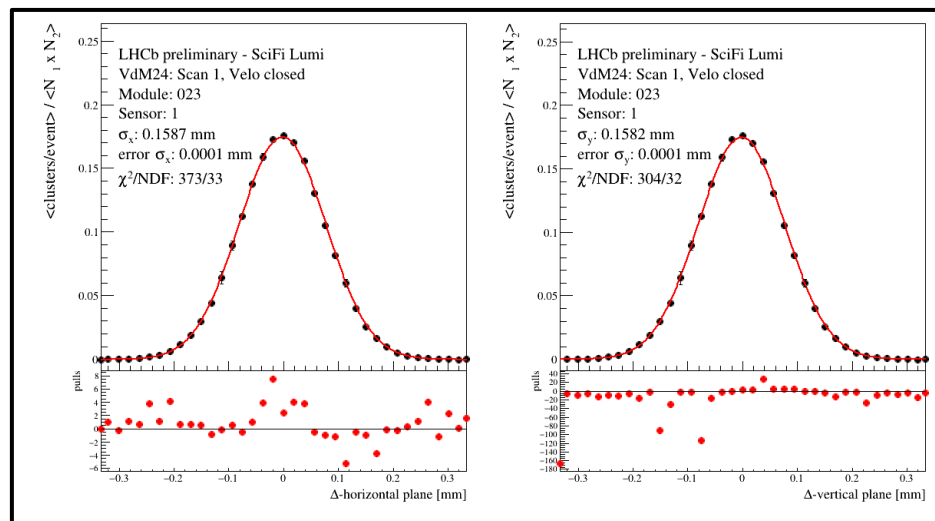
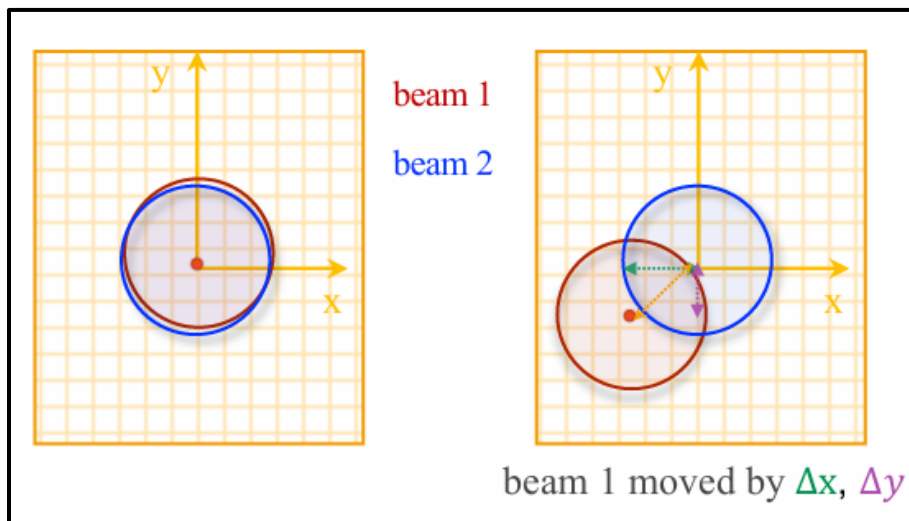


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SATEL011_0, ['T3L0Q1M0H0', 'T3L0Q1M0H1']
SATEL012_0, ['T3L0Q1M1H0', 'T3L0Q1M1H1', 'T3L0Q1M2H0']
SATEL012_1, ['T3L0Q1M2H0', 'T3L0Q1M2H1', 'T3L0Q1M3H0']
SATEL013_0, ['T3L0Q1M3H1', 'T3L0Q1M4H0', 'T3L0Q1M4H1']
SATEL013_1, ['T3L0Q1M4H1', 'T3L0Q1M5H0', 'T3L0Q1M5H1']
SATEL021_0, ['T2L0Q1M0H0', 'T2L0Q1M0H1']
SATEL022_0, ['T2L0Q1M1H0', 'T2L0Q1M1H1']
SATEL022_1, ['T2L0Q1M2H0', 'T2L0Q1M2H1']
SATEL023_0, ['T2L0Q1M3H0', 'T2L0Q1M3H1']
SATEL023_1, ['T2L0Q1M4H0', 'T2L0Q1M4H1']
SATEL031_0, ['T2L1Q1M0H0', 'T2L1Q1M0H1']
SATEL032_0, ['T2L1Q1M1H0', 'T2L1Q1M1H1']
SATEL032_1, ['T2L1Q1M2H0', 'T2L1Q1M2H1']

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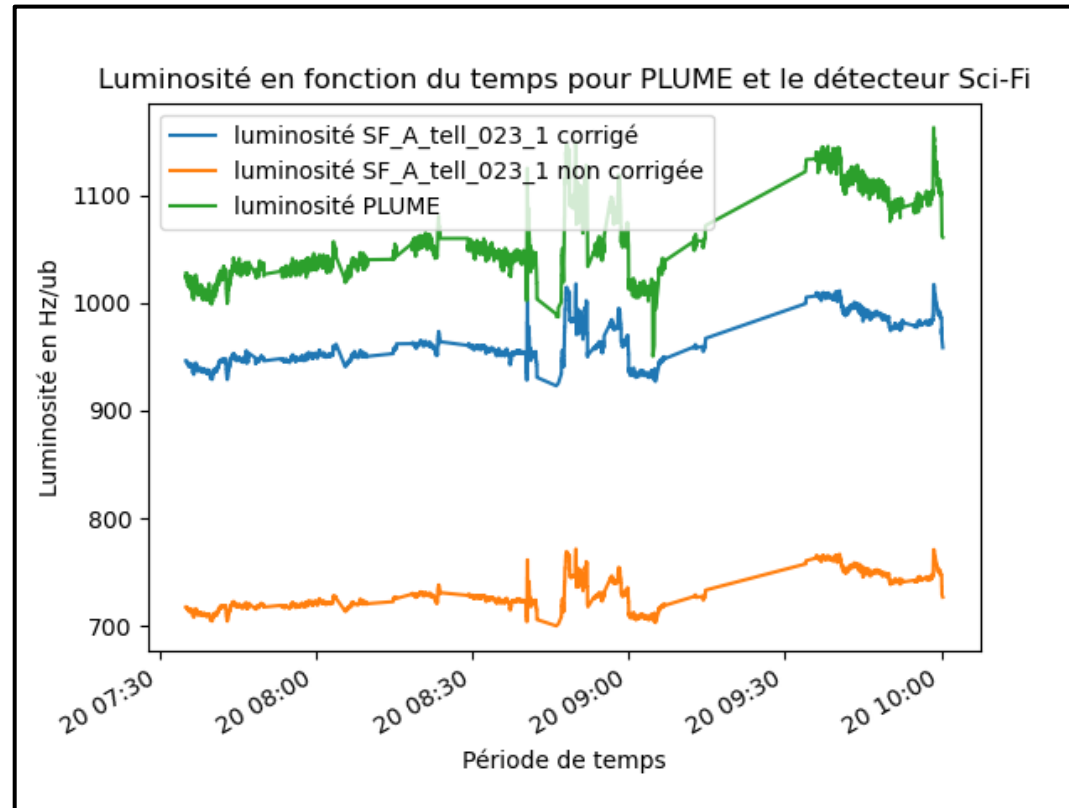
VDM Scan



$$\begin{aligned}\sigma_x &= 0.1587 \text{ mm} \\ \sigma_y &= 0.1582 \text{ mm} \\ \sigma_{\text{vis}} &= 228,7 \text{ } \mu\text{barn}\end{aligned}$$

$$\begin{aligned}\mu_x &= 0.00138 \\ \mu_y &= 0.00149\end{aligned}$$

Measure of luminosity



min = $9.23029 \cdot 10^{32} \text{ Hz/cm}^2$

max = $1.017638 \cdot 10^{33} \text{ Hz/cm}^2$

Average difference = 9.12%

Morel Matéo M1 Physics and Application