

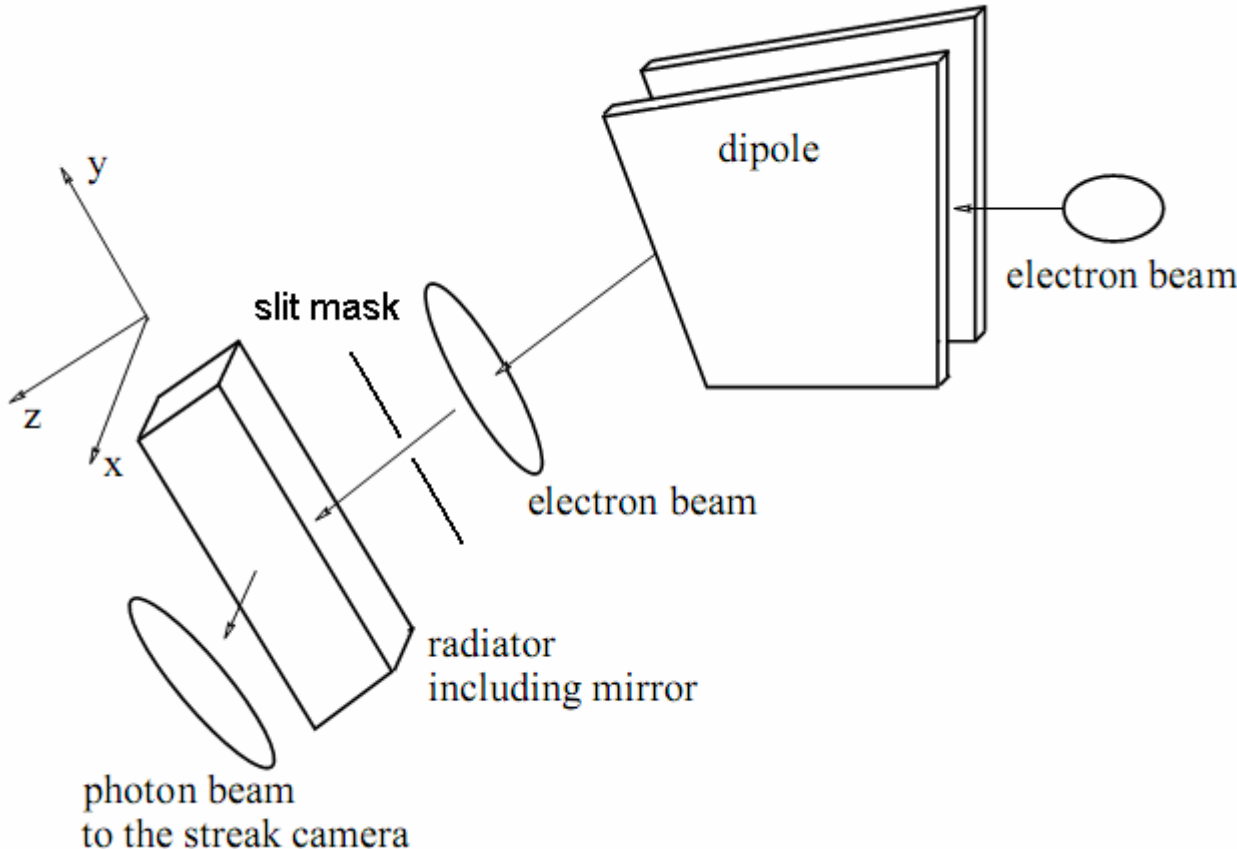
Techniques for longitudinal phase space measurements

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Content

1. Dipole + Aerogel + Streak camera
(PITZ, DESY, Germany)
2. Deflection cavity + Dipole + screen + camera
(SPARC, INFN/LNF, Italy)

Dipole + aerogel layout



Dipole + aerogel time resolution

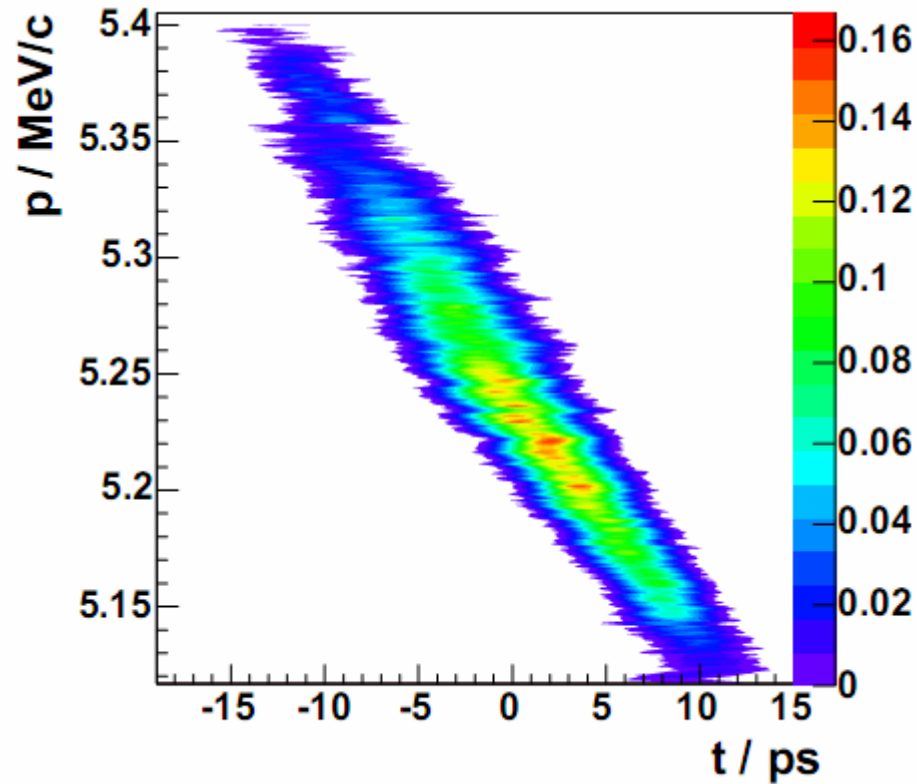
Aerogel time resolution – 0.22 ps (5 MeV)

Optical transmission line – 1 ps

Streak camera time resolution – 2 ps

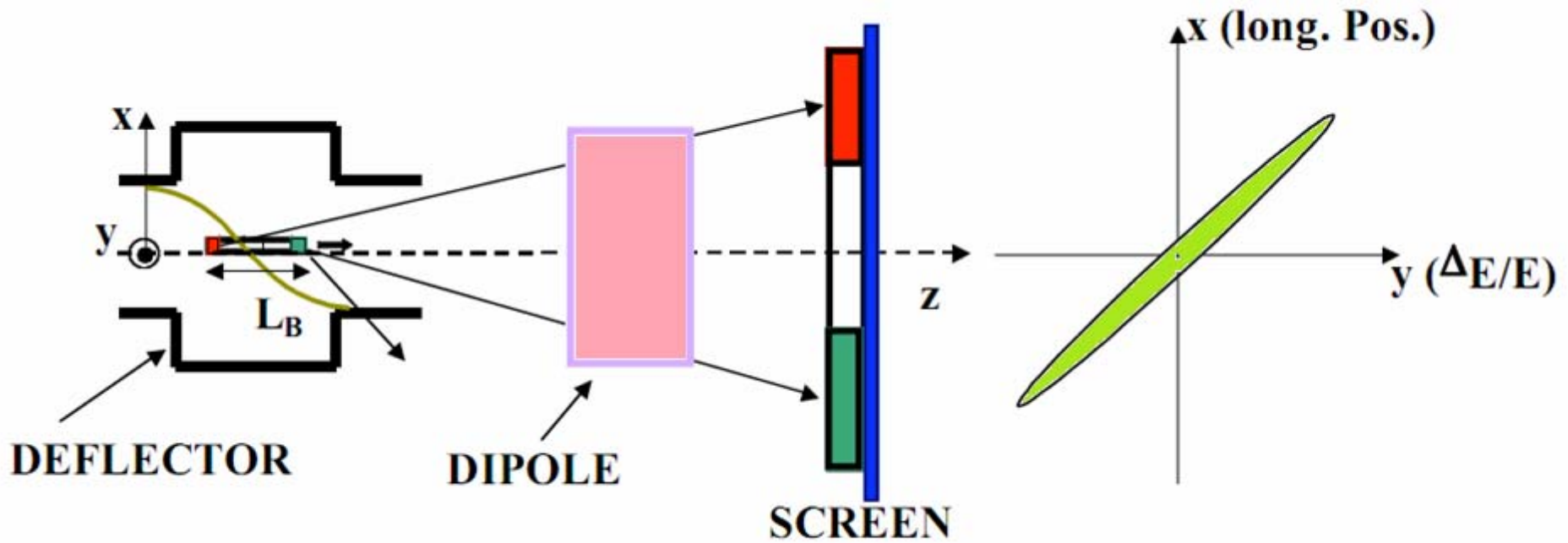
Total resolution – 3.2 ps

Dipole + aerogel experimental results (PITZ)



$Q = 1.0 \text{ nC}$

Deflection cavity basics



Deflection cavity resolution

For following parameters:

$$f_{\text{RF}} = 1.3 \text{ GHz}$$

$$V_0 = 1 \text{ MV}$$

$$E = 20 \text{ MeV}$$

$$\underline{\sigma_x = 20 \text{ } \mu\text{m}}$$

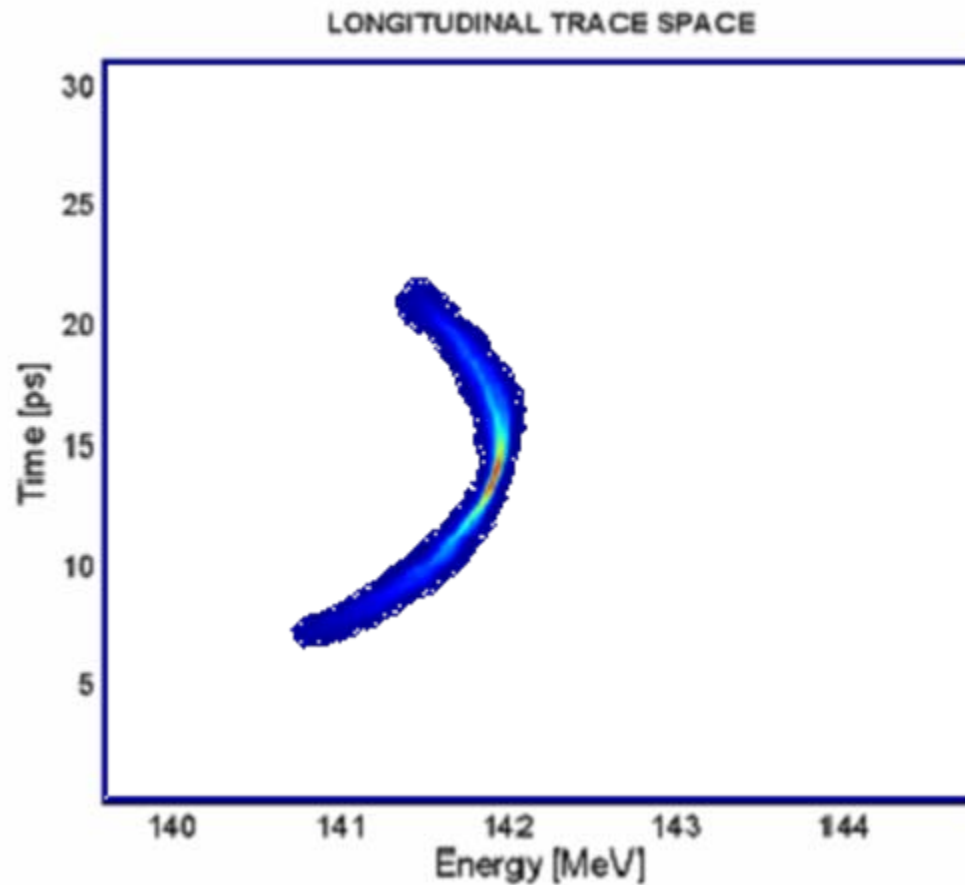
$$L_{\text{B}} = 6 \text{ mm (20 ps)}$$

$$L = 1 \text{ m}$$

$$X_{\text{B}} = 4 \text{ mm}$$

$$L_{\text{res}} = 30 \text{ } \mu\text{m (0.1 ps)}$$

Deflection cavity experimental results (SPARC)



$Q = 0.2 \text{ nC}$

Conclusion

	Aerogel	Deflection cavity
Time resolution	3.2 ps	0.1 ps
Energy resolution	0.5 %	0.5 %
Single bunch measurement	-	+