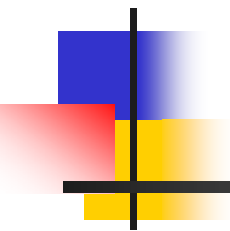


# **Proposal to Study Proton Small-Angle Scattering by Oriented Crystals on CERN SPS External Beam**



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# Useful formulas

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$$\frac{d^2 x}{ds^2} + \Omega^2 x = 0$$

$$\Omega^2 = \frac{8U_0}{p v d^2}.$$

$$\Psi_L = \frac{d}{2} \Omega = \sqrt{\frac{2U_0}{p v}}$$

$$\lambda = \frac{2\pi}{\Omega}$$

$$L_D \sim p v \left( 1 - \frac{p v}{(p v)_c} \right)^2$$

$$\sigma = \frac{13,6(\text{MeV}/c)}{p(\text{MeV}/c)} \sqrt{\frac{L}{L_R}} \left[ 1 + \frac{1}{9} \lg \left( \frac{L}{L_R} \right) \right]$$

# SPS H8 Beam Line

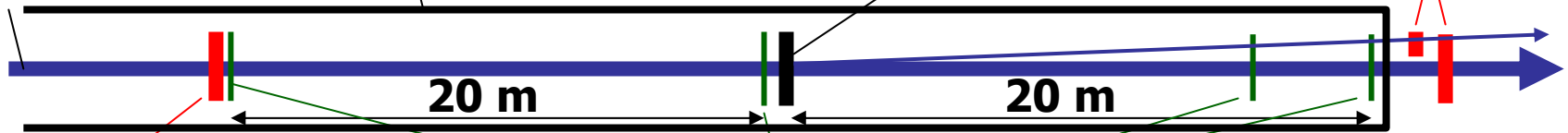
Beam line parameters taken from  
C.Biino et al., PL B403(1997)163

$10^5$  protons/s  
400 GeV/c  
3  $\mu$ rad  
5mmx5mm

Vacuum pipe

Crystal

Scintillators S2, S3



Scintillator S1  
0.5 mm (1  $\mu$ rad)

Silicon with X- and Y-strips  
X-position resolution 30  $\mu$ m  
0.3 mm (1.5  $\mu$ rad)

**AMS type  
detector**

$\theta_{\text{critical}} \approx 10 \mu\text{rad}$

$\theta_{\text{bending}} \approx 100 \mu\text{rad}$

$\sqrt{2 \times 30 \mu\text{m} / 20\text{m}} \approx 2 \mu\text{rad}$