

RHIC Aperture Requirements

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RHIC APERTURE REQUIREMENTS

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APERTURE REQUIREMENTS (Au)

γ	$N_B = 1.2 \times 10^9$				0.6×10^9		
	ϵ/π	δ	S (eV.sec)	σ_L (m)	ϵ/π	δ	S (eV.sec)
	$\times 10^{-6}$	$\times 10^{-3}$			$\times 10^{-6}$	$\times 10^{-3}$	
5	70	1.0			49	0.93	
12.5 operation	34.5	1.22		1.25	25	1.03	
12.5 injection	10	0.53	0.2		10	0.53	0.2
26.4 transition	10	4.2 *	1.0				
100	18.4	0.79		1.15	15	0.59	

* LMV, $h = 6 \times 57$, 30 sec acceleration time

Physical aperture requirements (operation at $\gamma = 12.5$)

$$= \pm \sqrt{6} \left(X_p \delta + \sqrt{\frac{\epsilon \beta}{\pi \gamma}} \right)$$

$$= \pm \left(x_{c.o. @ \Delta p/p = \pm 3 \times 10^{-3}} + \sqrt{6} \frac{\epsilon \beta}{\pi \gamma} \right) \quad (\text{J. Claus})$$

Good field aperture requirement

$$= \pm \left(\sqrt{6} X_p \delta + \sqrt{\frac{\epsilon \beta}{\pi \gamma}} \right)$$

Other aperture requirement definitions

$$\pm 6 \left((X_p \delta)^2 + \frac{\epsilon \beta}{6\pi\gamma} \right)^{1/2} \quad (\text{A. Ruggiero})$$

$$\pm \left(2.64 (X_p \delta + \sqrt{\frac{\epsilon \beta}{6\pi\gamma}}) + 1.2 \text{ cm} \right) \quad (\text{HERA-p})$$

$$\pm \left(8.4 \left((X_p \delta)^2 + \frac{\epsilon \beta}{6\pi\gamma} \right)^{1/2} + 1.2 \text{ cm} \right) \quad (\text{HERA-e})$$

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RHIC MAGNET APERTURES
for Luminosity Calculations
(mm)

	Good field		Aperture	
	Arc	Arc	Arc	Low β Insertion
RHIC-3 in	± 25.4	± 32	± 32	± 70
SSC	± 20	± 27	± 27	± 27

Required* - Au				
@ 12.5 operation	± 18	± 36	± 36	± 104 vert. ± 86 horiz.
@ 12.5 injection	± 8	± 18	± 18	± 56
@ transition	± 19	± 25	± 25	± 39
@ 100 operation	± 6	± 10	± 10	± 27

*RHIC-2 lattice