BNL-101585-2014-TECH
RHIC/PG/42;BNL-101585-2013-IR

RHIC Aperture Requirements

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March 1984

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RHIC APERTURE REQUIREMENTS

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March 9, 1984

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3/7/84

APERTURE REQUIREMENTS (Au)

	$N_B = 1.2 \times 10^9$				0.6×10^9		
γ	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	

* 1MV, h = 6×57, 30 sec acceleration time

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

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

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

Good field aperture requirement

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

Other aperture requirement definitions

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

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

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

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RHIC MAGNET APERTURES
for Luminosity Calculations
(mm)

	Good field	Aperture	
	Arc	Arc	Low β Insertion
RHIC-3 in	± 25.4	± 32	± 70
SSC	± 20	± 27	± 27
Required* - Au			
@ 12.5 operation	± 18	± 36	± 104 vert.
			± 86 horiz.
@ 12.5 injection	± 8	± 18	± 56
@ transition	± 19	± 25	± 39
@ 100 operation	± 6	± 10	± 27

*RHIC-2 lattice