Trigger Study Summary, E. Garcia.

(i) Timing

	PADDLES	RINGS
Resolution	2 ns	150 ps
Vertex Cut (Δt)	5 ns	300 ps
Recovering time(1)	100 ns	100 ns

(1) Time that takes one paddle to be ready for next signal after being hit

(ii) Singles Counting RATE

a. Assuming a nominal 4.5 x 10^6 Hz RHIC frequency and nominal average luminosity 2 x 10^{26} cm^{+2} s^{-1}:

σ_{Au_Au} = 6.64 x 10^{-24} cm^{-2} -> Rate = 1324 Hz
-> 2.9 x 10^{-4} int./crossing

σ_{Au_He} = 2.7 x 10^{-24} cm^{-2} -> Rate = 800 Hz
-> 1.77 x 10^{-4} int./crossing

σ_{e+e-} = 3.3 x 10^{-20} cm-2 -> Rate(2) = 5 x 10^{-6} Hz
-> 1.1 pairs/crossing

(2) Prob. of zero pair prod = exp(-1.43) -> prob. no zero = 0.76
RATE(1 pair) = Rate(σ e+e-) * prob. no zero

(iii) From simulation, see figures for:

(a) Average number of hits (3) per interaction per detector module (*multiplicity*).
(b) Average numbers of modules with a hit per interaction (*occupancy*).

(3) A hit is when a particle deposits in a module ΔE > ΔE_cut (1.2 MeV paddles, 6.2 MeV rings).

(iv) Trigger Efficiencies.

a. Au + Au (see figures)

b. Trigger rate from background:

	PADDLES(4)	RINGS(5)
1. e+e-	Rate < 45 Hz	Rate < 45 Hz
2. Beam Gas	Rate < 136 Hz	Rate < 0.1 Hz

(4) Upper limit, requiring mult. > 3, occ. > 1 at z+ and z-, no Δt cut implemented in simulation.

(5) Upper limit, requiring mult. > 1, occ. > 4 at z+ and z-, no Δt cut implemented in simulation.

(v) Kinetic Ranges, see figure.

a. Average ΔE energy deposited in paddle counter module = 1.8 MeV

b. Average ΔE energy deposited in ring counter module = 7.0 MeV

c. About 4% of particles will deposit less than 1.5 MeV in paddles for min-bias Au+Au

d. For the number of MIPs hitting counters, see multiplicity figure.