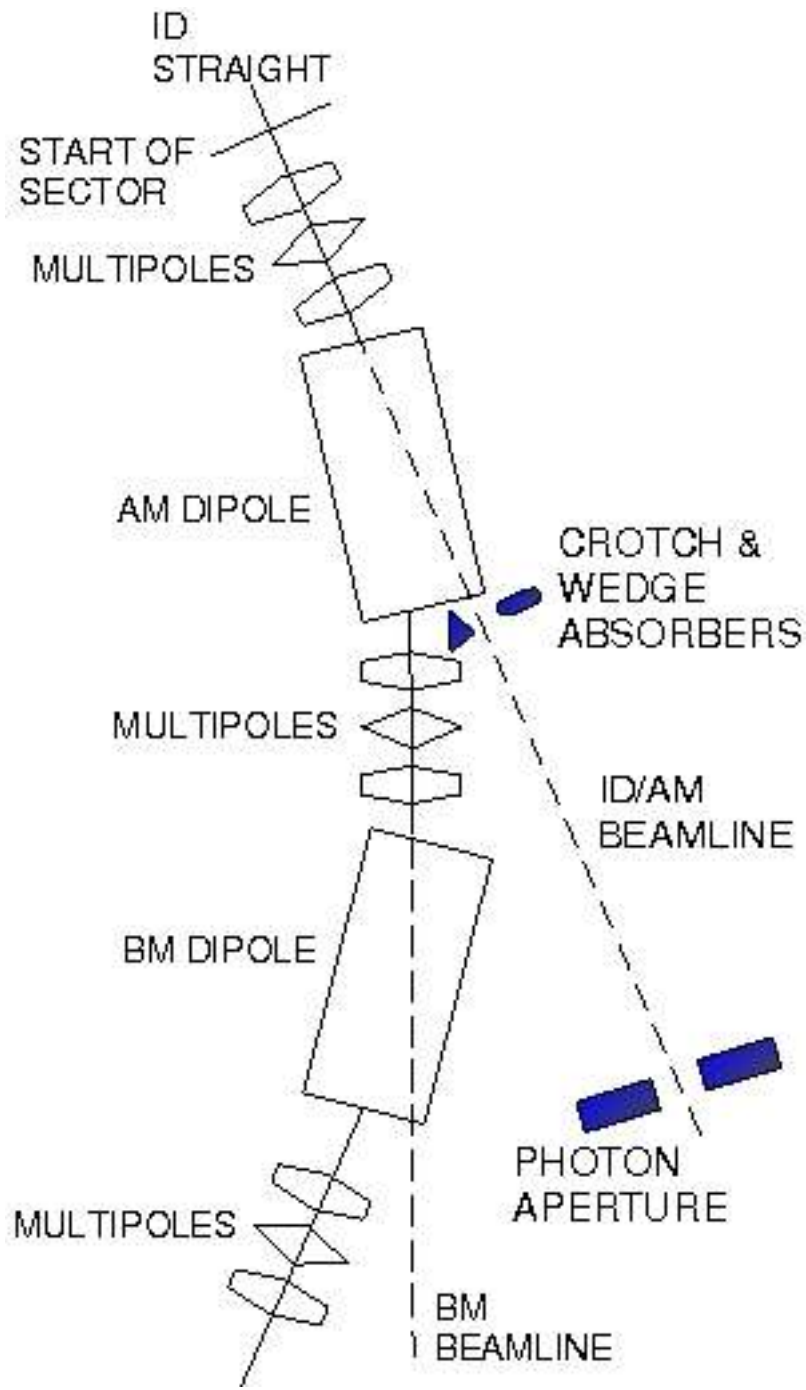
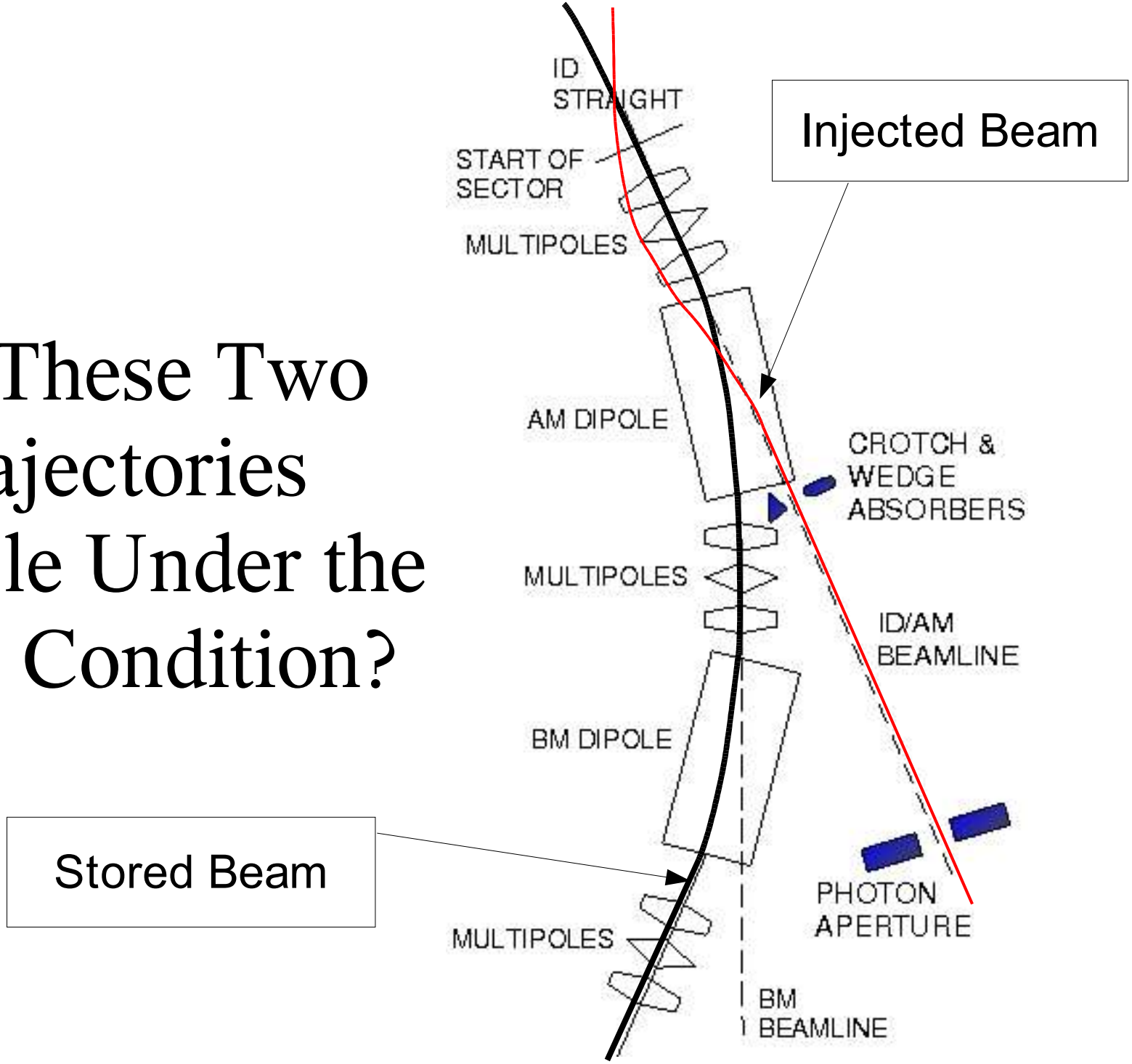
Effect of Apertures on Top-up Safety

L. Emery

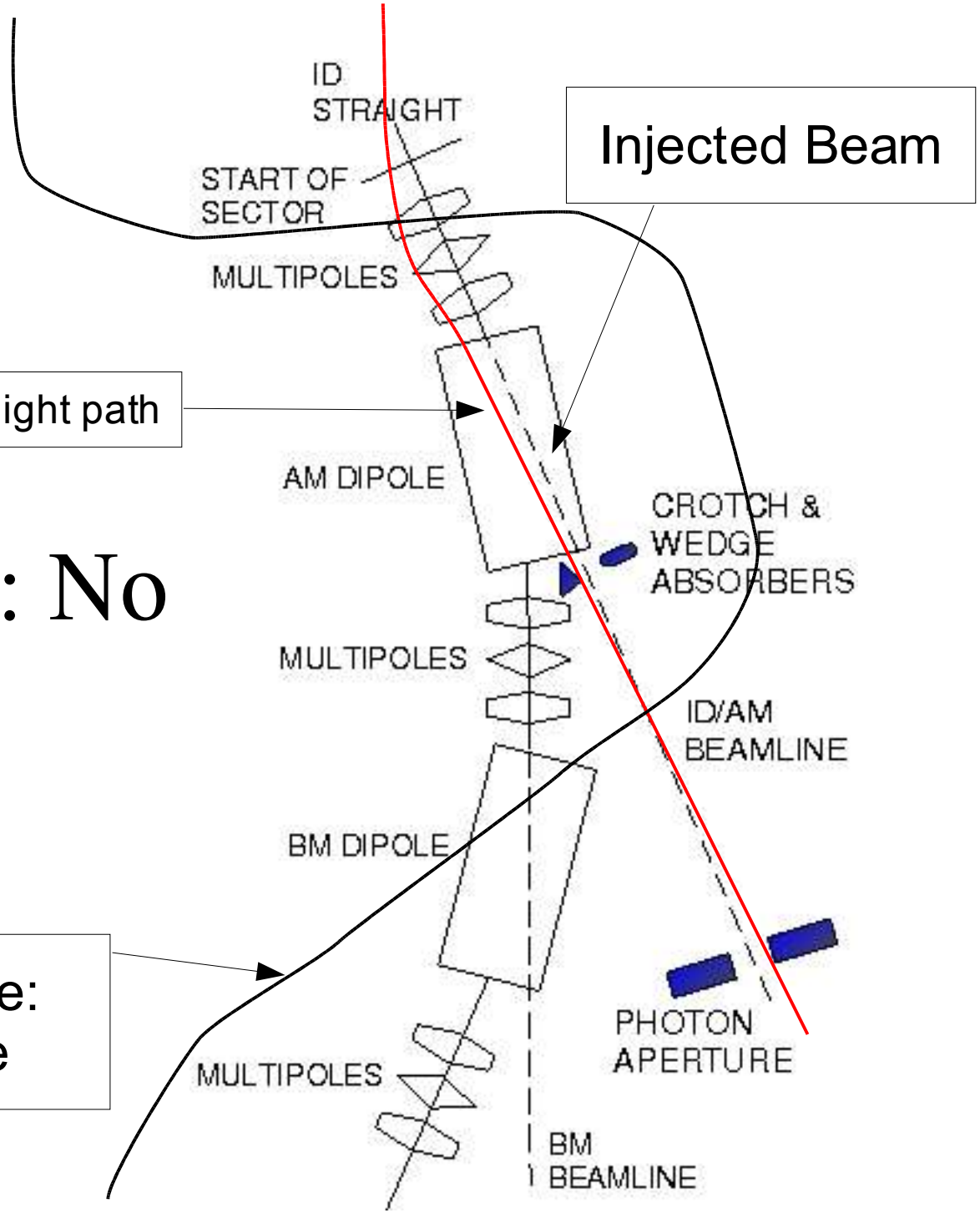
Layout of Magnets and Photon Path



Are These Two Trajectories Possible Under the Same Condition?



Dipole Failure: No



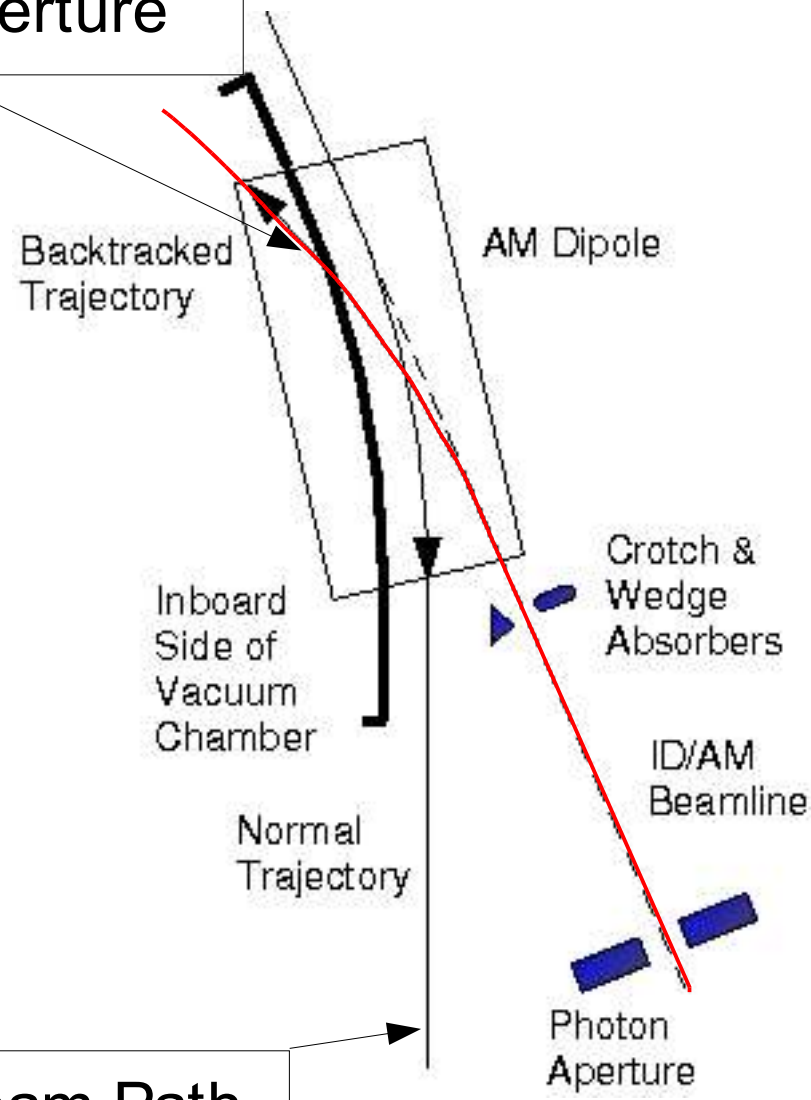
Injected Beam

Note: Straight path

No Stored Beam Possible:
Need > 30 cm aperture

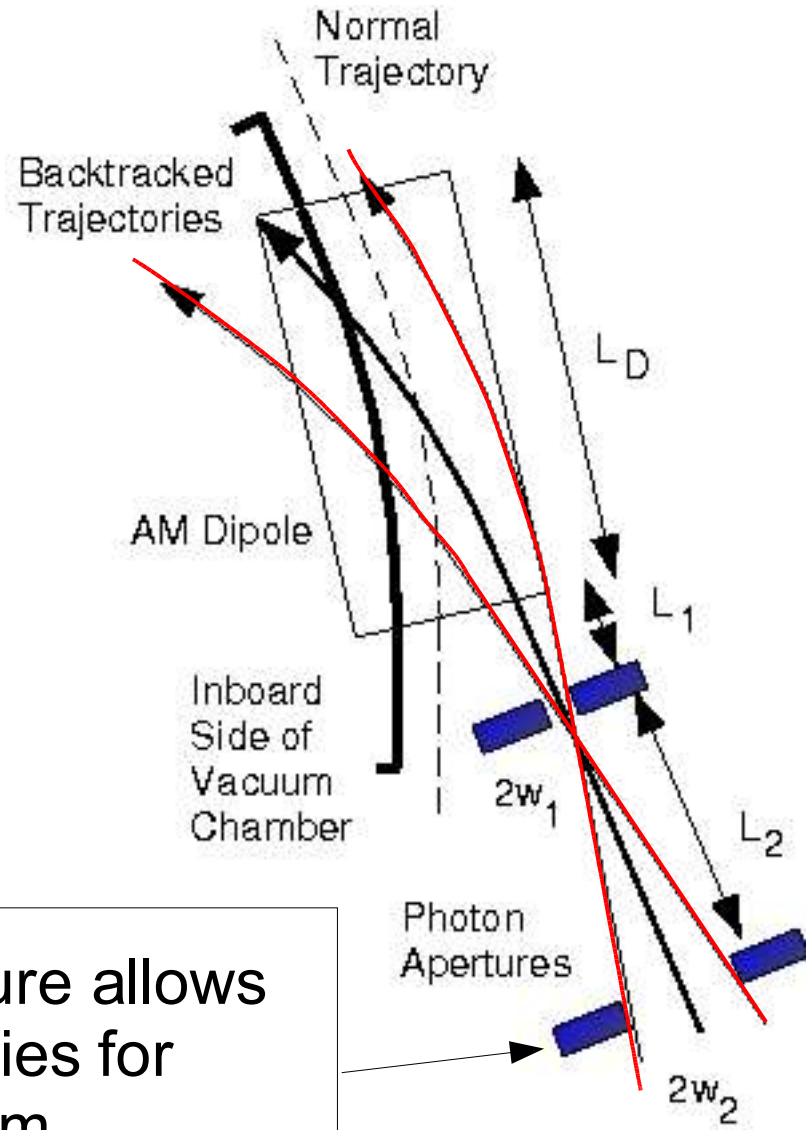
Hypothetical Injection Beam Path:
Impossible because of aperture

Normal Dipole: No



Stored Beam Path

Effect of Aperture Size on Possible Trajectories



Large photon aperture allows "easier" trajectories for injected beam

Particle Trajectory Simulations

- Many sets of possible magnets errors, including *partial* dipole short.
- In actual ring, aperture size has very high tolerance, but aperture position can be displaced.
- Simulation used design aperture size plus 5 mm as tolerance because it is easier to do than aperture displacement.
- Aperture size error = aperture position error
- Very conservative equivalence.