Electrons vs $\pi^0$
in water Cherenkov

- Try to see if $\pi$ zeros with 2 overlapping $\gamma$ can be separated from electrons
- Polfit finds weak second rings but at higher energies its efficiency drops
- 2 overlapping $\gamma$ in principle shower differently than one electron of the same energy
- Is the difference large enough?
- Use 1KT simulation and fitting

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Angles between $\gamma$'s

- **500 MeV pions**
  - All fitted events
  - Rate of single ring $\gamma\gamma = 0.37$

- **1000 MeV pions**
  - All fitted events
  - Rate of single ring $\gamma\gamma = 0.78$
Using true MC vx and directions

Graph 1:
- Title: 1000 MeV
- Colors: red - electrons, green - pi0
- Legend: ID 822
- X-axis: cos(openth)
- Y-axis: weights=Q per 1 PMT

Graph 2:
- Title: 1000 MeV
- Colors: red - electrons, green - pi0
- Legend: ID 814
- X-axis: xalong
- Y-axis: weights=Q/angeff*avdist per 1 PMT
Using fitted vx and directions - 500 MeV

500 MeV - 1 ring

weight = Q/angeff*vxdist per 1 PMT
Using fitted vx and directions - 1000MeV

1000 MeV - 1 Ring

weight=Q/angeff*vxdist per 1 PMT

pizeros electrons
Difference in log likelihood

500 MeV
1 Ring

pizeros
electrons

1000 MeV
1 Ring
Difference in log L vs angles between gammas

Separation or log L difference does not seem to depend on the angle.
Conclusions

- A separation is still not very effective at higher energies.
- Seems to be more efficient at 1000 MeV than Polfit.
- May be useful as an additional discriminant factor.
- Will try SK simulations to see if better granularity helps.