Methods in ALFA ALignment

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Outline

What is ALFA?

- ALFA is a set of detectors 240m from ATLAS.
- Measures the absolute luminosity and total cross section
- Studies elastic and diffractive protons.

My Role

- The ALFA detectors are mobile.
- Their alignment can vary from run to run.
- I must attempt to determine their alignment, using collected data, to within μm.
- Both positive and negative results are informative.

Rotation

- My initial attempt to align Monte Carlo data
- Able to align, but only to tenths of radians

Hot Spot: Theory

- The scatterplot of ALFA diffractive hits has a particular distribution
- The center tends to have more events and thus, better determined errors.
- The error *of the error* should be minimized at the dense region

Hot Spot: Results

Kinematic Peak: Theory

- Create distributions of kinematic variables: θ, ϕ, t, etc.
- Compare to the ideallized distributions if the detectors were positioned perfectly
- Determine the shift needed to recreate ideal distributions

Kinematic Peak: Results

Current/Future Work

- Rewrite all of my code..

Concerns

- Computer problems!
- Might have to take my computer to IT ☹

Pictures