

## Student Operations Shift Report: Z Mass

Describe the tests to determine if the CMS or ATLAS detector is calibrated.

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Reason this is important to CMS or ATLAS operation:

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Physics principles in detection and measurement of muons:

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Reasoning to support that the tests described above will determine if the CMS or ATLAS detector is calibrated:

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
**Claim:**



Evaluate the test results to determine if the CMS or ATLAS detector is calibrated.

**Questions to consider:** What is the mass of the Z boson according to your measurements? Are these consistent with the known Z mass?

**Evidence:**

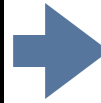


Attach any plots or calculations.

**Questions to consider:** What data supports the claim? How is this data presented?

**Reasoning:**

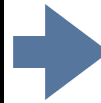
**Questions to consider:** Why does the data compel this claim? Is anything left out?



Justify how and why the evidence backs up the claim. Use scientific principles to explain *why* you got this data. Use and explain relevant scientific terms.

**Sources of Uncertainty in Measurement:**

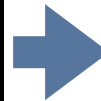
**Question to consider:** Why and to what extent can we trust your results?



What is the uncertainty in the measurement?  
How do determine this?

**Practical Applications:**

**Question to consider:** How might this information be useful to the CMS or ATLAS collaboration in understanding the detector?



What is the value of what you learned?