ATMOSPHERIC DISCOVERY MISSION

Pikes Peak Community College DemoSat Team 2016
Mission Overview

• Map the distribution of charged particles in the atmosphere to find a correlation between the number of charged particles and the amount of aerosols.
• Determine if bismuth’s diamagnetism can repel small local magnetic fields and charged particles.
• Observe the effects of bismuth’s low thermal conductivity at low temperatures.
Experiment Overview: CMOS Active Pixel Detector

CMOS Image of alpha particles [1]

CMOS Image of beta particles [1]
DESIGN OVERVIEW
Design: Structure And Heating

- Oblong structure composed of 2.54cm foam.
- Exterior insulated with a layer of Great Stuff
- Dimensions: 30.5cm x 12.7cm x 13.3cm
Design: Bismuth Experiment

- Bismuth sample was placed on one side, with an active pixel detector, opposite the control side.
- Bismuth dimensions: 6cm in length with a diameter of 3cm.
Command and Data Handling: Sensors

- CMOS
- CMOS (Bismuth)
- Spectrometer
- Arduino Uno
- 5V GND A1
- Temperature Sensor #1
- 5V GND A1
- Temperature Sensor #2
- Magnetometer
- Humidity Sensor
- Temperature Sensor
- Real-time Clock
- CMOS APD
- Open Log
# Budget and Mass Summary

<table>
<thead>
<tr>
<th>Item</th>
<th>Ordered From</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Sensors</td>
<td>Sparkfun</td>
<td>$6</td>
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<tr>
<td>CMOS</td>
<td>Sparkfun and Adafruit</td>
<td>$111.85</td>
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<td>Solderable Breadboards</td>
<td>Sparkfun</td>
<td>$11.80</td>
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<td>Micro SD cards</td>
<td>Amazon</td>
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**Remaining Budget** $252.35

**Mass Summary**

<table>
<thead>
<tr>
<th>Structure</th>
<th>240g</th>
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<tbody>
<tr>
<td>Final Mass</td>
<td>930g</td>
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DATA COLLECTION
Data From Testing

Bismuth Temperature Test

Bismuth Temperature Test - End
Data From Testing: Radiation Test with Bismuth

Test 2

Counts per Minute vs. Time (10 sec)

Test 1

Counts per Minute vs. Time (10 sec)
A SPECIAL THANKS TO:

The Pikes Peak Community College Machining Center

Our Faculty Advisor: Liz Coelho

The rest of our team for their help throughout the semester.
   Retrieved From: http://www.randombio.com/webcam.html