Influence of Barometric Pressure on Muon Rate

Introduction

We used the data from the University of Rochester muon detector to find a relationship between muon rate and barometric pressure. The detector has two scintillating plates and it operates at 370 hz. It is also much larger than Mendon's detector at a size of 2 square meters. This provides for much more reliable information because it has a smaller rate of error than the smaller ones. The detector was running through October 5th through the 14th to get the data.

Discussion

As barometric pressure increased, we found a decrease in muon rate. This shows an anti-correlation between pressure and muon rate. The correlation was very strong, which combined with the large detector and the long ten day testing period, makes for very accurate and convincing data.

Conclusion

Billions of muons pass through our atmosphere undetected. However, the ones that we have detected have shown a very peculiar trend. In using the data we analyzed from the University of Rochester detector, we were able to determine a strong anti-correlation between barometric pressure and the rate of muon detection. This concludes that as pressure increases, muon rate decreases. When there is a higher pressure, the gas molecules in the atmosphere are much closer together; this causes an increase in galactic cosmic rays (GCR's) colliding with gas atoms in the atmosphere. Due to the ionization process, the energy potential of the muon decreases, and it slows down, which in turn makes the muon slower, allowing a much greater possibility of decay before reaching the earth. This is why the muon rate decreases with increasing pressure.