



-- MuSTAnG --

Muon Spaceweather Telescope
for Anisotropies Greifswald

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SEE2007



Co-Authors

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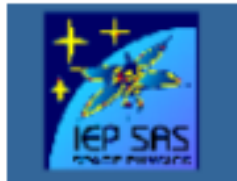
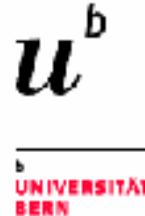
W. Göhler, HTS Coswig, Germany

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International Cooperation



With financial support by ESA



Spaceweather Storms



Coronal mass ejections (CME) provide hazards to the earth environment, in particular to satellites, and to power lines on ground.

Precursor Storm Signal

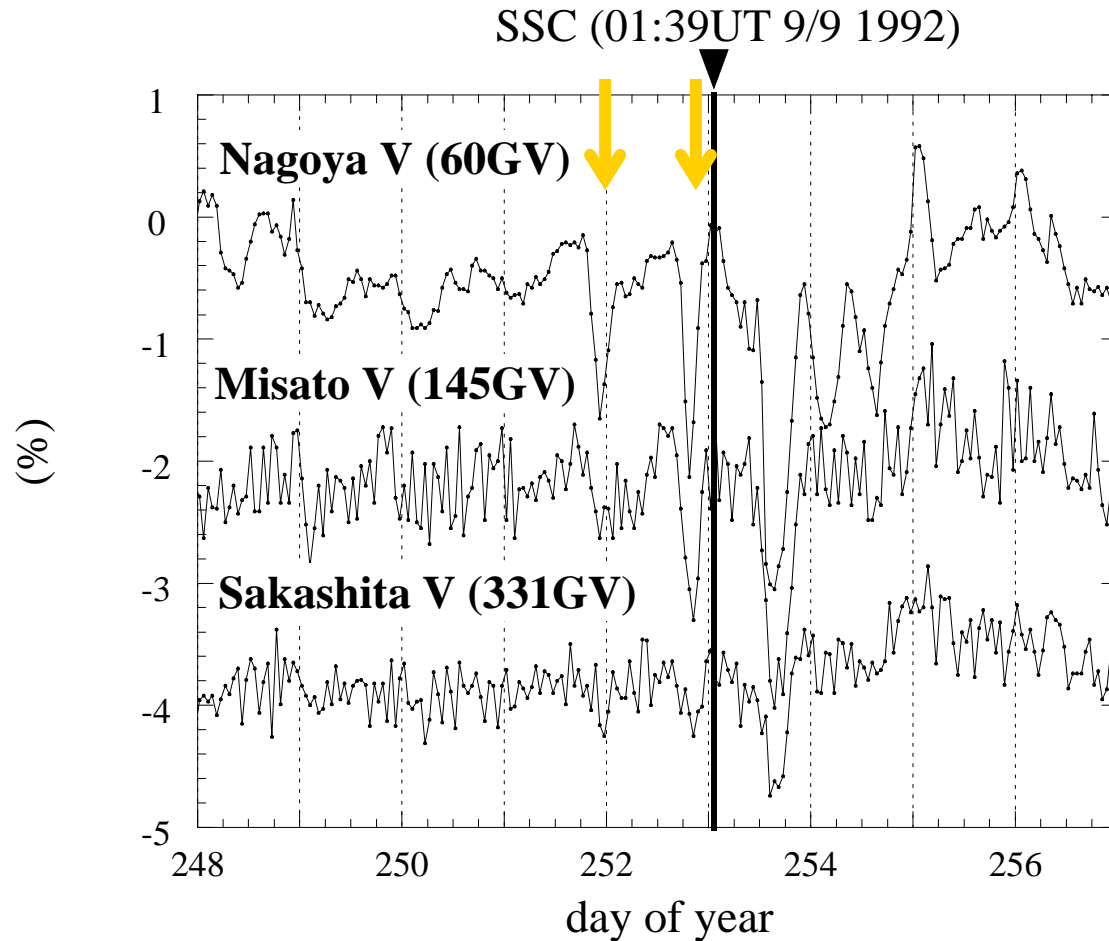
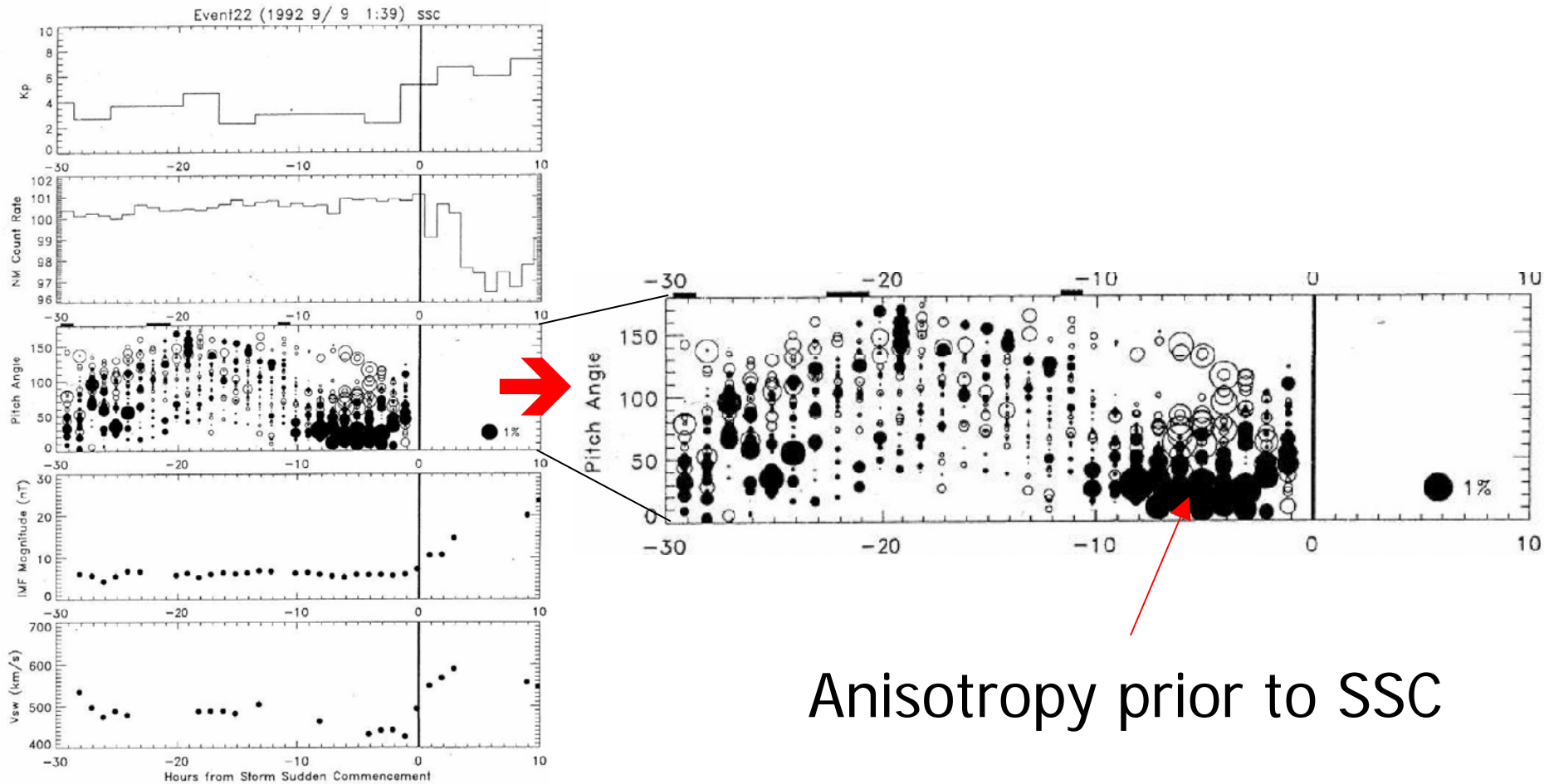


Figure 13: Ground-based observations for the period covering the geomagnetic storm on September 9, 1992 (from top to bottom): K_p geomagnetic index, McMurdo neutron monitor relative count rate, anisotropy derived from the muon telescopes (\circ PAI, \bullet PAD), IMF magnitude and solar wind velocity (for details see Ref. [17]).



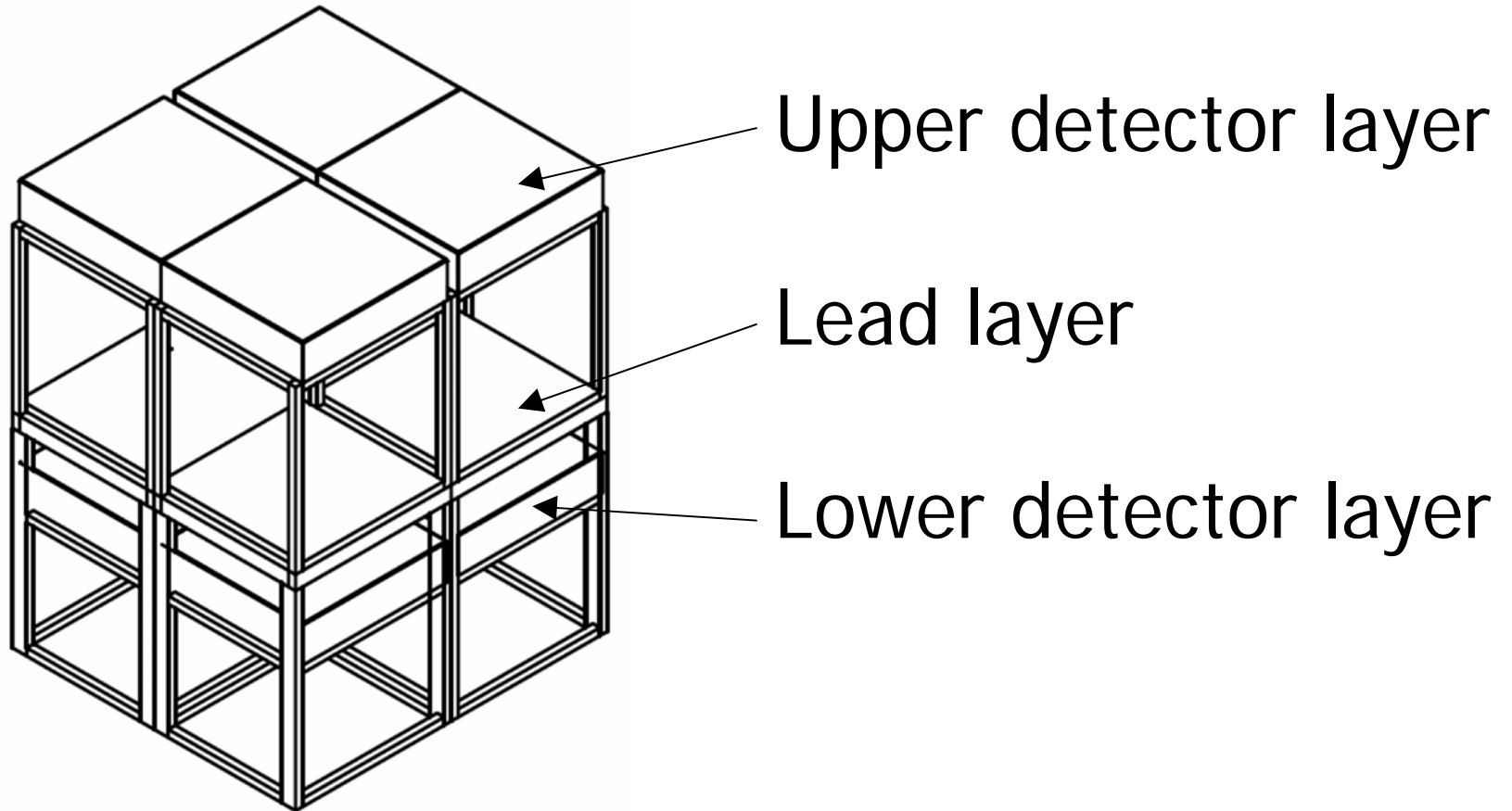
Anisotropy prior to SSC



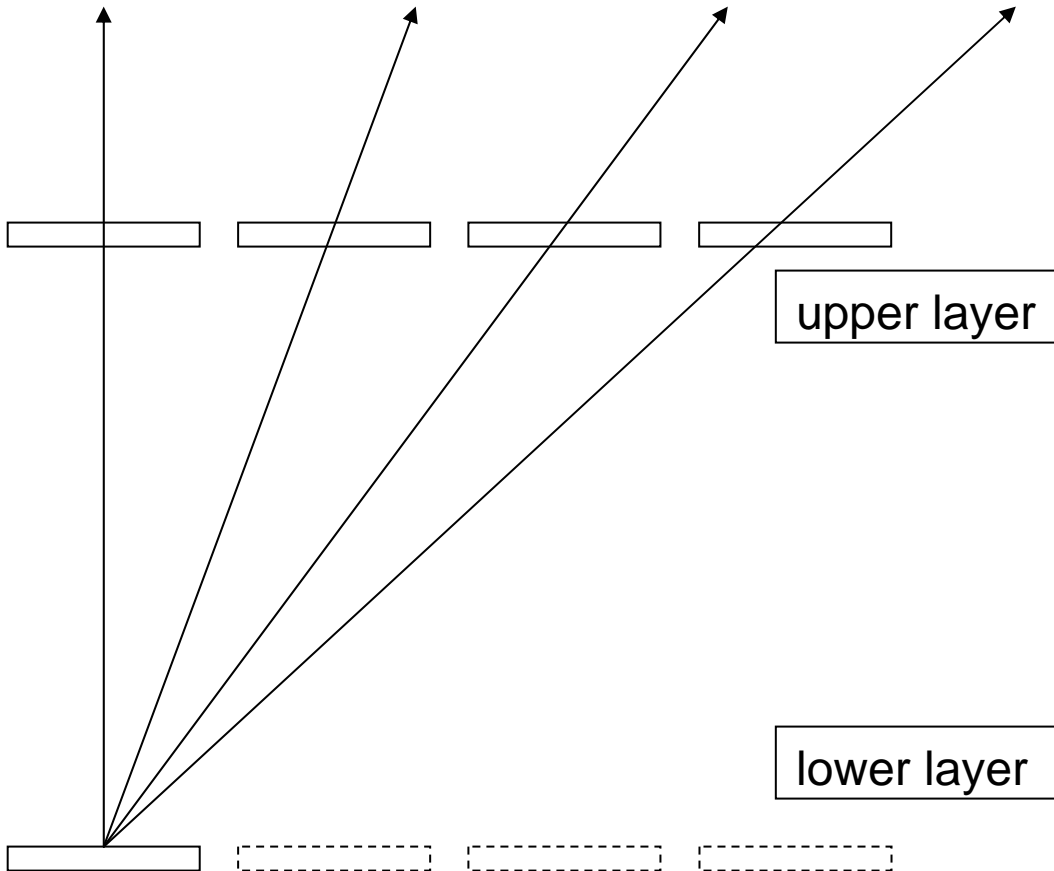
MuSTAnG

- Muon Spaceweather Telescope for Anisotropies at Greifswald
- Multi-directional muon telescope for spaceweather forecasting
- Stage 1: $2 \times 16 = 32$ detectors of 0.25 m^2 size each
- Stage 2: Extensions to up to $2 \times 36 = 72$ detectors foreseen

MuSTAnG: phase 1 (4m²)

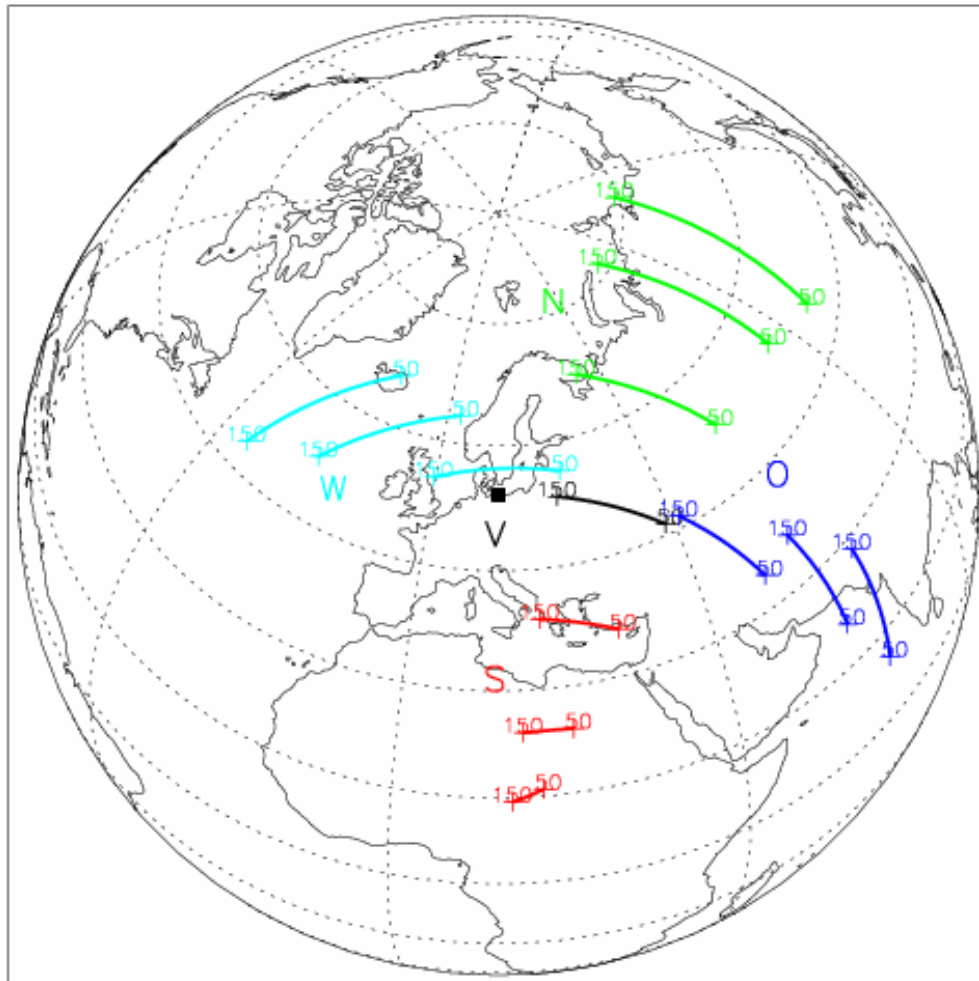


Viewing directions



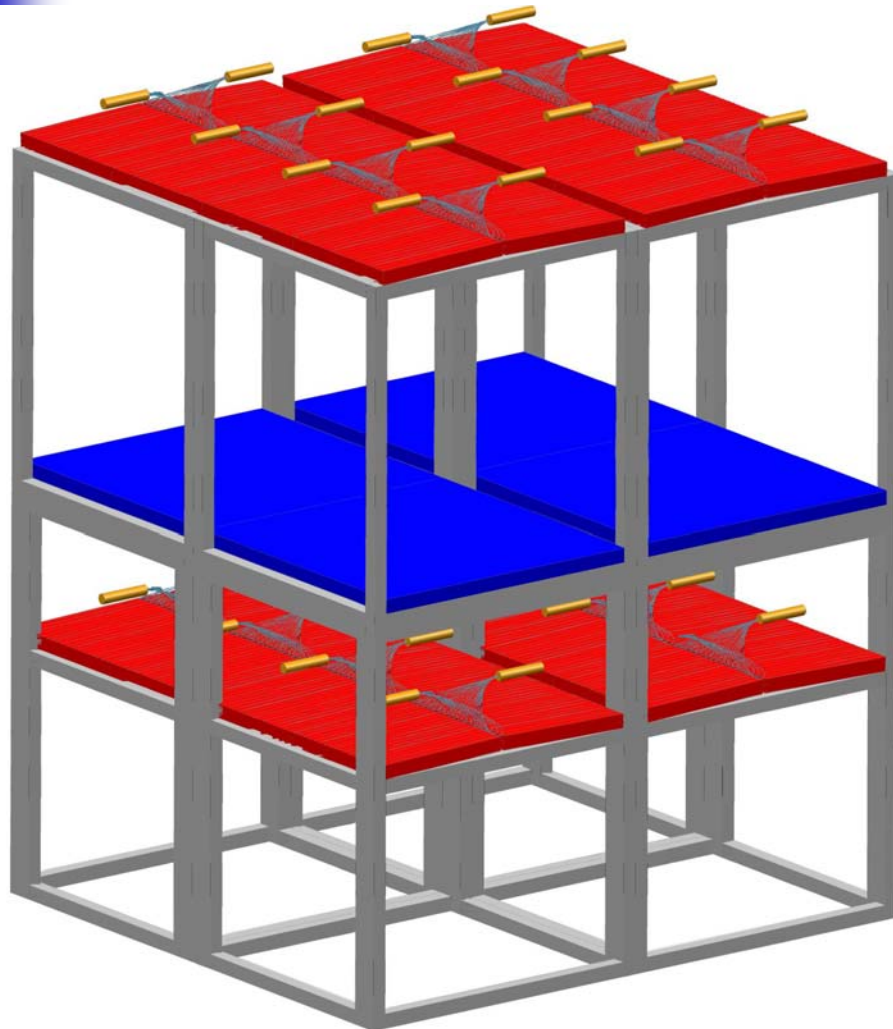
Viewing directions are defined by the passage of a single muon through one upper and one lower detector.

Asymptotic viewing directions

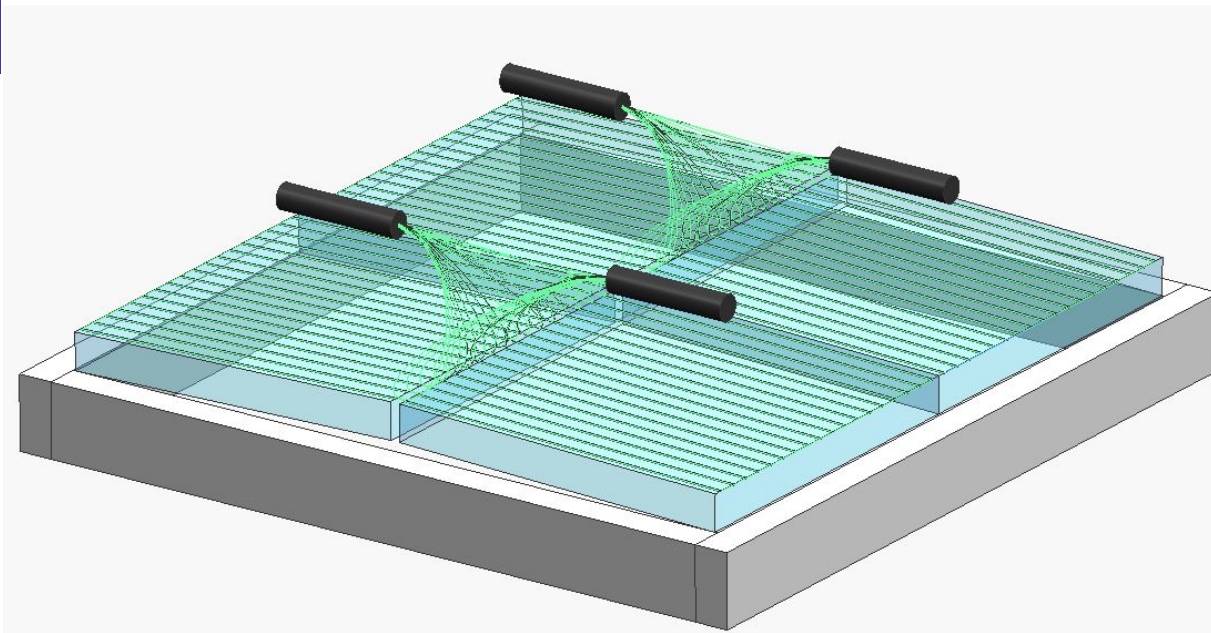


- Location: Greifswald
- 13 (of 49) Viewing directions: V, N, E, S, W
- Detector size: 0.25 m²
- Rigidity spectrum: 50-150 GV

MuSTAnG: phase 1 (4m²)



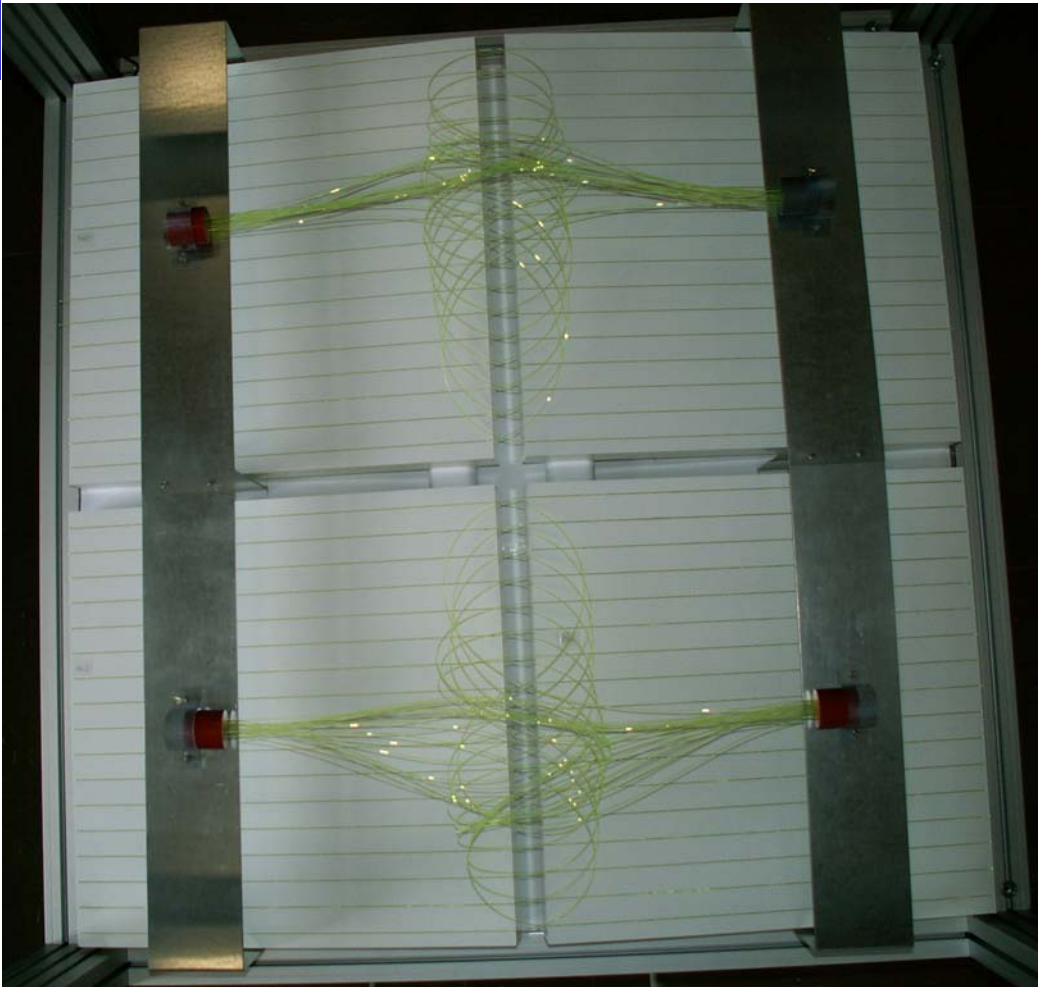
Detector element ($4 \times 0.25 = 1 \text{ m}^2$)



Detector box:

- 4 scintillator plates each with
- 17 wavelength-shifting fibres connected to
- P30A photomultiplier modules

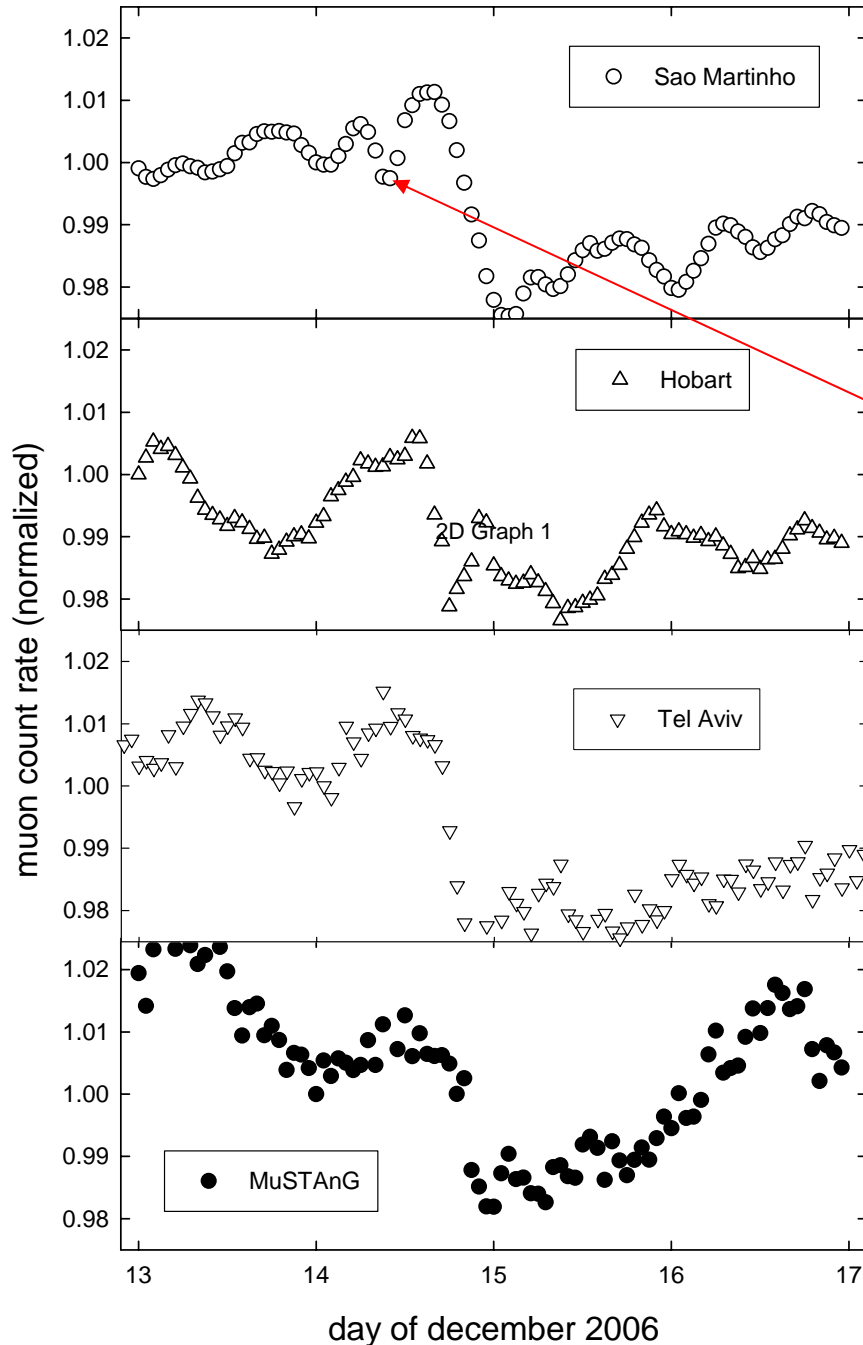
Scintillator plates with wavelength-shifting fibres



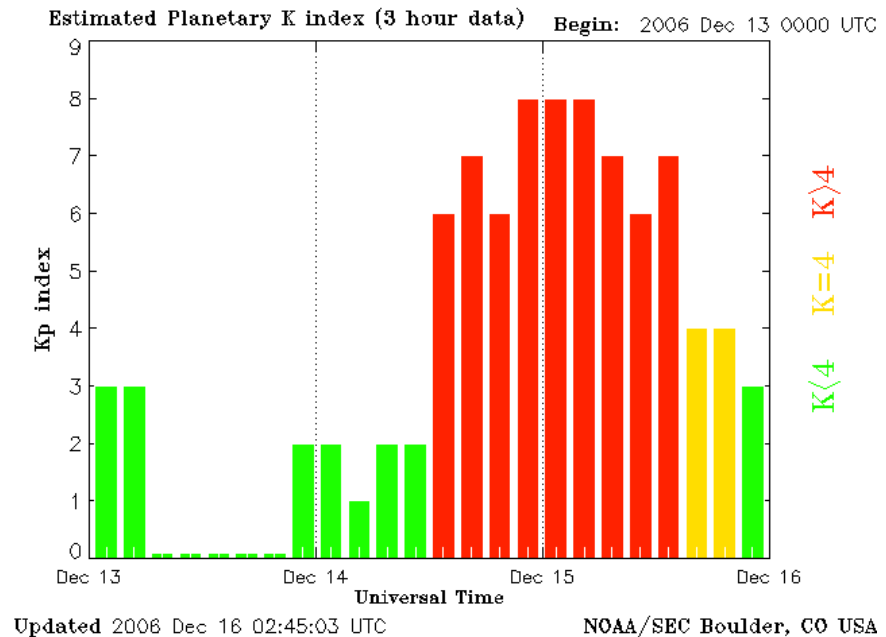


Muon telescope observations

13 December 2006 space weather event



Precursor





Integration of MuSTAnG into existing muon telescope network

MuSTAnG will be part of an international muon telescope network:

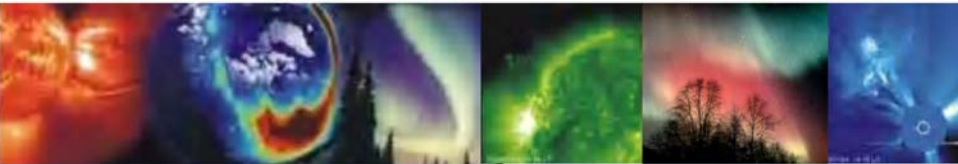
- Nagoya (Japan)
- Hobart (Australia)
- Sao Martinho (Brazil)
- Bartol (USA)



Space weather Fair

www.sweets2007.net

www.sweets2007.eu



First European Space Weather & Earth Environment

Technology Fair

19 - 21 November 2007

Greifswald - Germany

First European Space Weather and Earth Environment Technology Fair

Space weather is described as conditions on the Sun and in the solar wind. Space weather affects the Earth's magnetosphere, ionosphere, and thermosphere and can influence the performance and reliability of space-borne and ground-based technological systems. It can also endanger human life and health. For example, communication and navigation satellites are vulnerable to space weather events and several satellites have been lost in such events. Electrical power failures and increased corrosion of pipelines has occurred during space weather-induced geomagnetic storms. Space weather storms enhance the radiation exposure to aircraft crew and passengers and provide large risks to manned spacecraft missions. As society makes increasing use of technologies that can be influenced by space weather, understanding space weather phenomena and their impact on technological systems that we use throughout our daily life becomes more and more important.

The goal of this fair is to bring together experts from Industry, Scientific Institutes, and the public in order to enhance the awareness of space weather effects and to discuss appropriate countermeasures.

Meeting format

The meeting consists of an industry exhibition, industry and user workshops, and rapporteur sessions.

Advisory and programme committee

Prof. Dr. R. Hippler (University of Greifswald, Germany)
 Dr. F. Jansen (1A, Greifswald, Germany)
 Dr. P. Beck (Austrian Research Center, Austria)
 Dr. A. Glover (ESA, The Netherlands)
 Prof. K. Kudela (Slovak Academy of Sciences, Slovakia)
 Dr. S. Poedts (KU Leuven, Belgium)
 Dr. B. Schmieder (Observatoire de Paris, France)
 Dr. R. Reis (Centro de Astrofísica da Universidade do Porto, Portugal)

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Organising Institutions

University of Greifswald, Institute of Physics
 Technology Centre of Western Pomerania
 1A - First Applications and Management consultancy



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Einladung - Invitation



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Thank

You