CubeSTAR

Vision:

Demonstrate a new
”Space Weather” satellite concept

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Outline

- Introduction
- Scientific mission
- Motivation
- System overview
- Challenges

Introduction

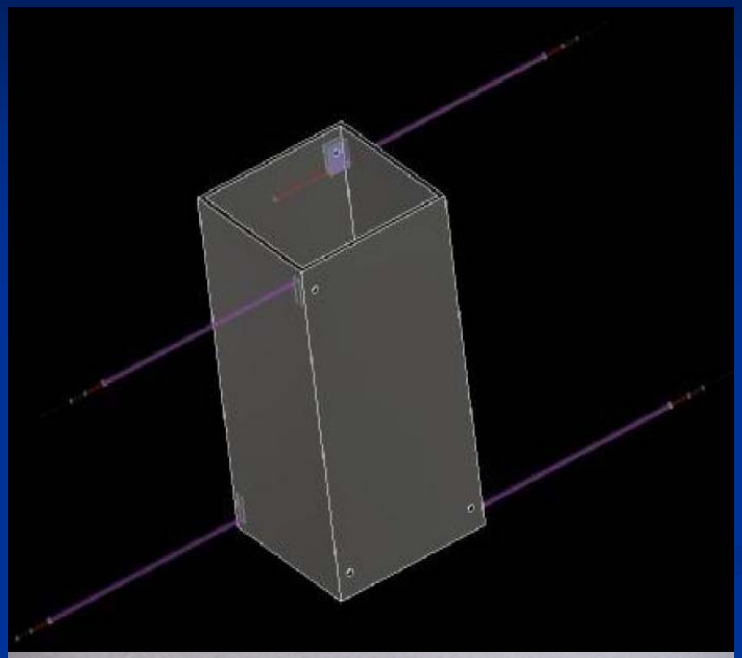
- CubeSTAR
  - Pico satellite
  - Scheduled launch in 2011/12
  - Low Earth Orbit (LEO)
  - CubeSat standard: 2U
- Built by students from the University of Oslo
- Scientific mission:
  - Demonstrate the multiple Needle Langmuir Probe (m-NLP) concept

Scientific mission I

- Mission Objective :

  To test 4 miniature Langmuir probes on a LEO satellite

- Perform high resolution mapping of electron density with 4 needle Langmuir probes



Scientific mission II

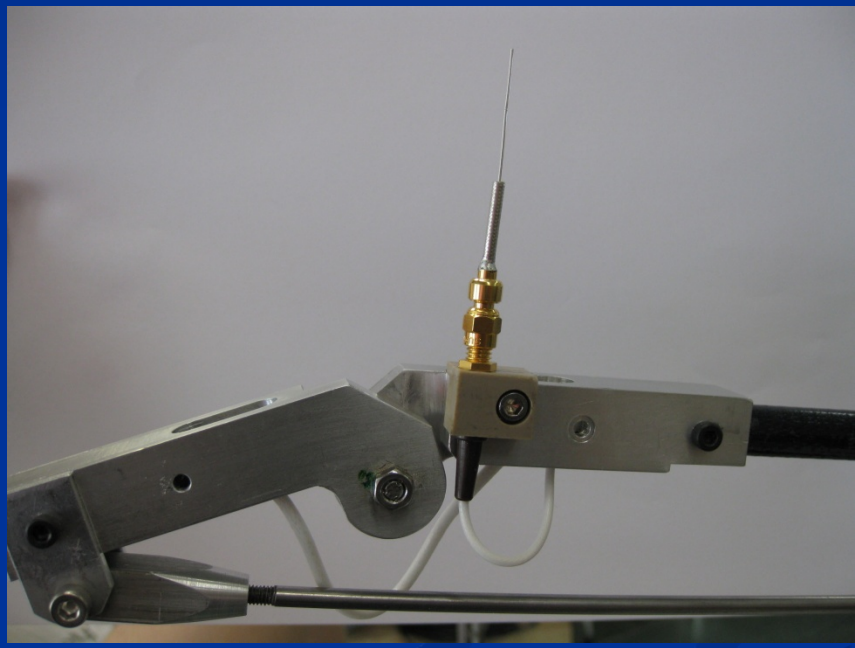
multiple – Neddle Langmuir Probes (m-NLP)

4 probes:

- Cylindric shape
- Fixed bias voltage

Advantages:

- Debye sheet effects can be ignored due to the small radius
- Fixed bias voltage allows for sampling rates up to 9 kHz
- Differential measurements removes the need for electron temperature (T_e)
- Electron density (N_e) becomes proportional to electron current (I_e)



Needle Langmuir Probe

- radius = 0.25 mm
- lenght = 25 mm

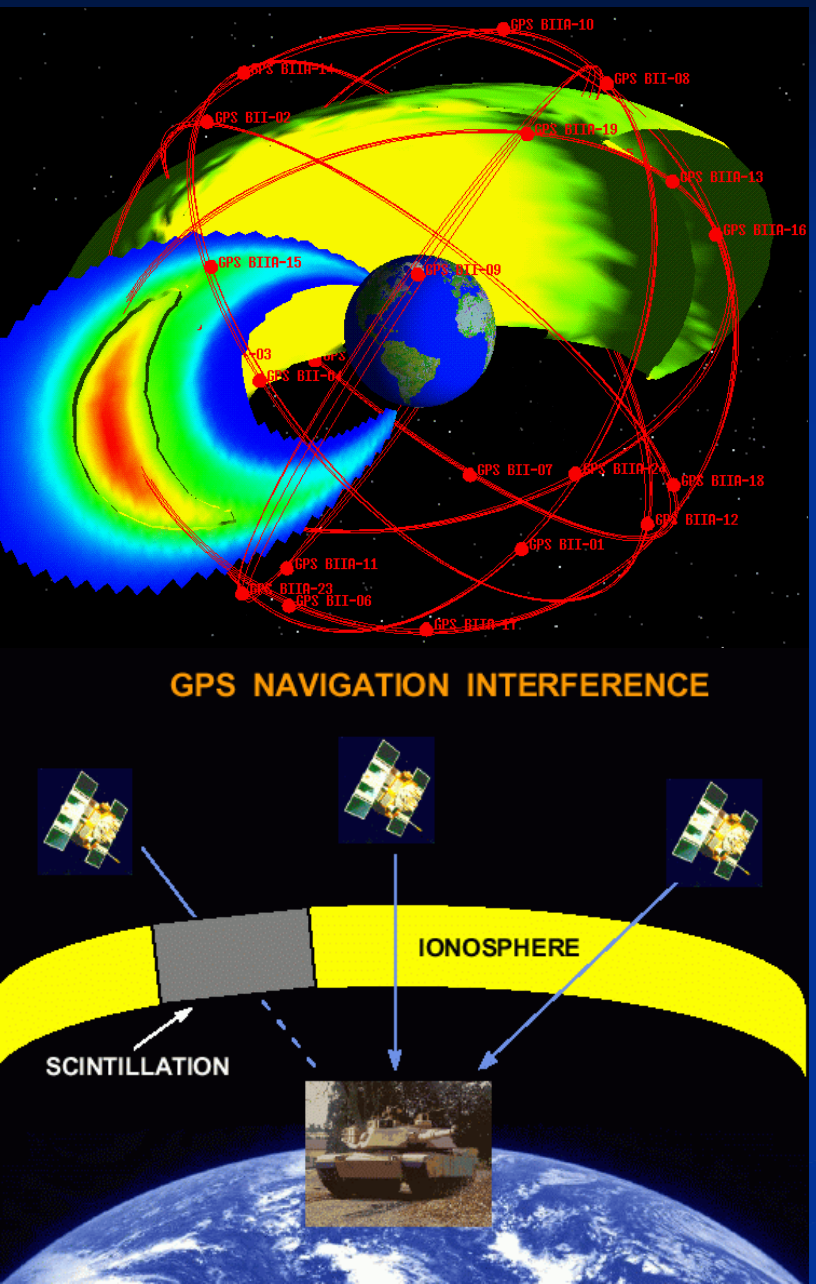
Scientific mission III

The concept has been verified in lab and practical testing:

ESTEC's plasma chamber April 2008

Sounding rocket - launched from Andoya Rocket Range, December 2008

Motivations



- Strong coherent HF backscatter echos is well known in the polar regions
- Global warming will give an increase to traffic and other activities in the Artic
- Need for more robust and accurate communication and navigation systems in this region

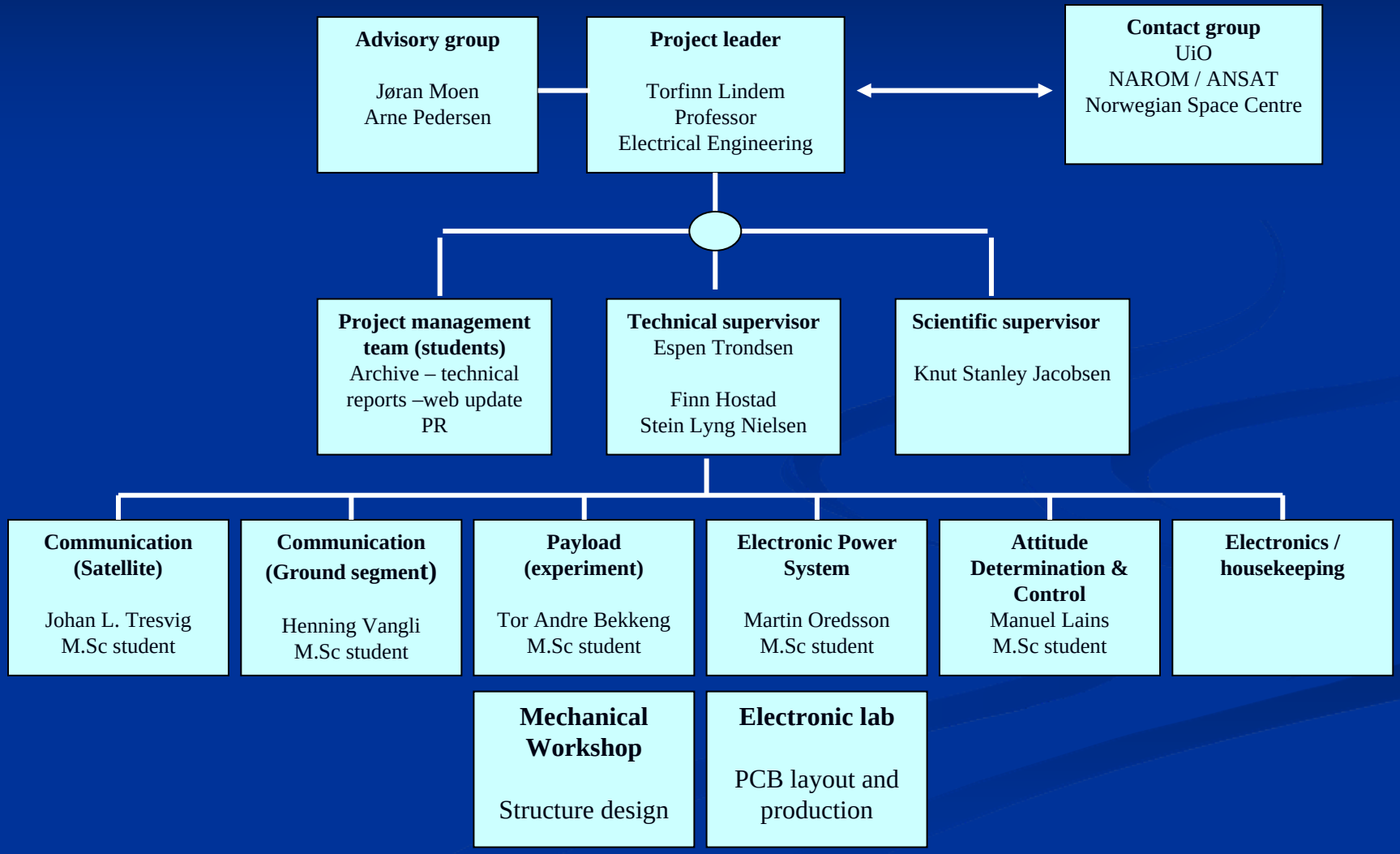
System Overview

5 Subsystems:

- On Board Data Handling
- Electronic Power System
- Attitude Determination and Control system
- Radio Communication
- Payload

- And Ground station

CUBESTAR Organization



Challenges

- Time
  - Short development and test time
- Technology
  - Stable satellite due to wake effect on the Langmuir probes
  - Large amount of collected data to download

Summary

- CubeSTAR
  - CubeSat standard
  - Low Earth Orbit satellite
  - Expected launch in 2011/12
- Satellite built by students
- Goals
  - Scientific: Demonstrate m-NLP concept
  - Academic: Recruit students for space technology

Questions?