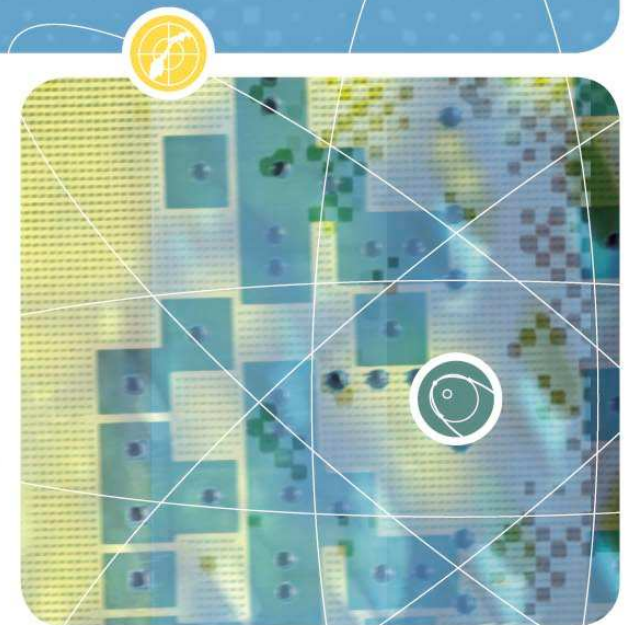


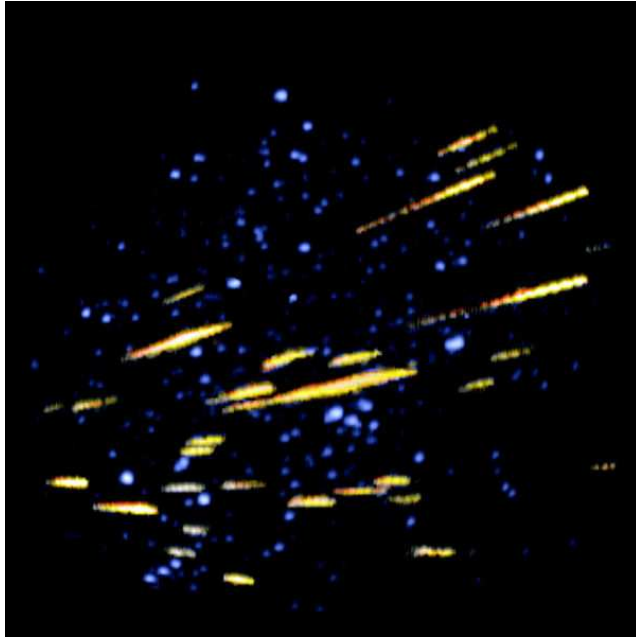
# ECOMA - Existence and Charged State of Meteoric Smoke Particles in the Middle Atmosphere



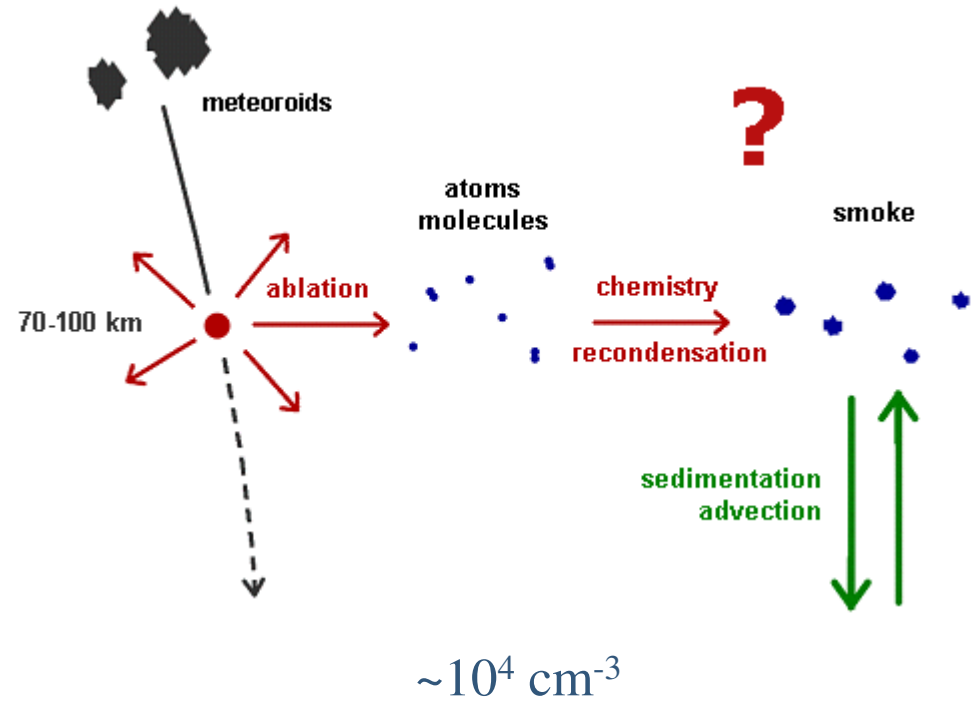
Knut Svenes, Ulf-Peter  
Hoppe, Alvin Brattli og  
Øystein Lie-Svendsen



# METEOR-INFLUKS

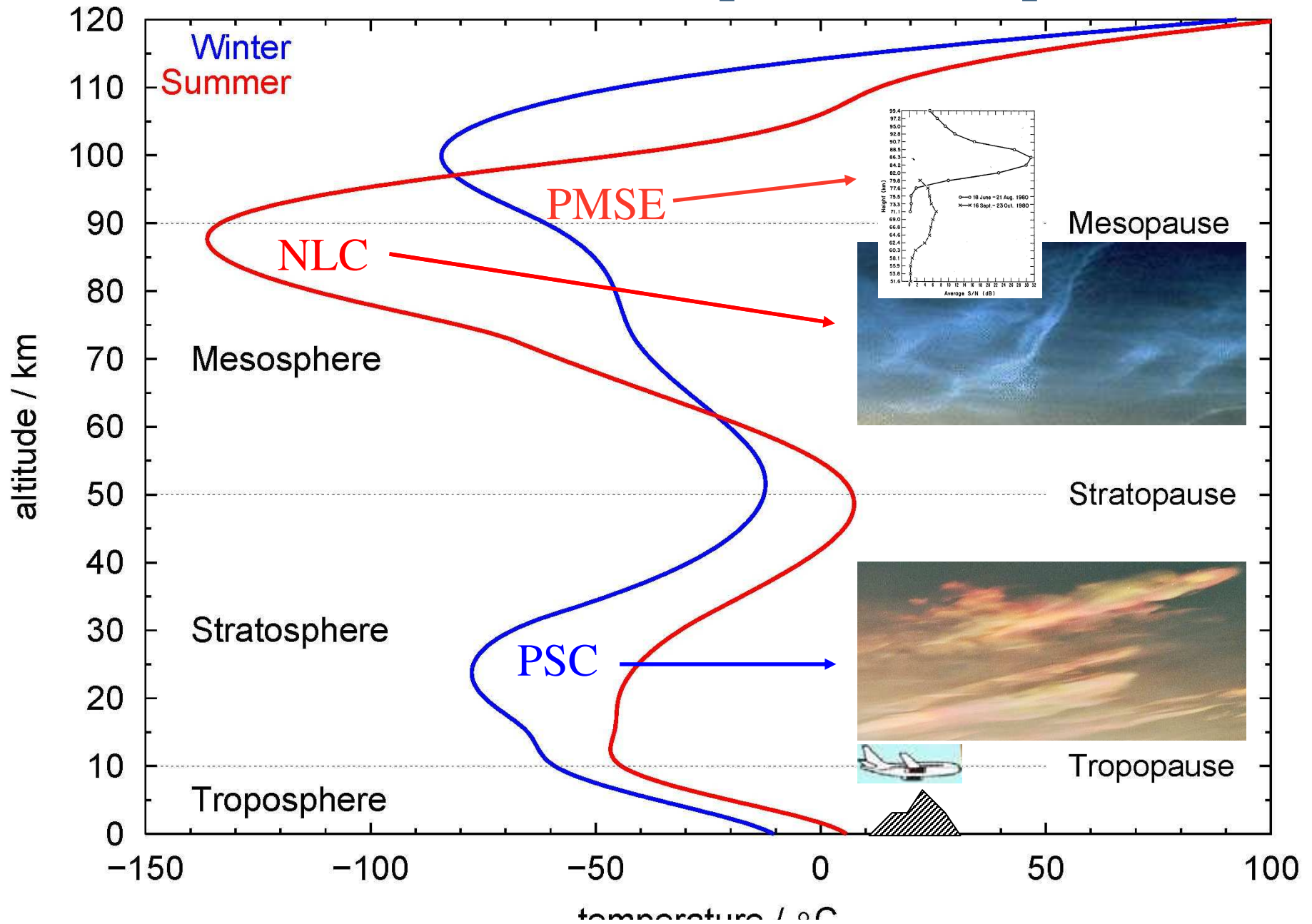


40 – 80 tonn daglig

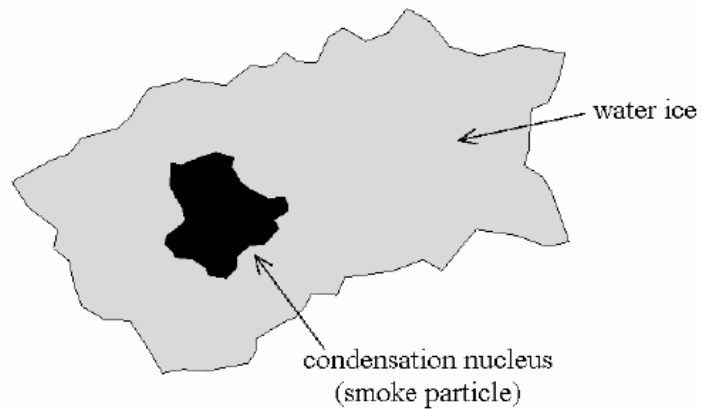


Partikkeltetthet/Atmosfæretetthet  $\sim 10^{-6}$

# Vertical structure of the polar Atmosphere



# IN SITU STUDIUM AV MIKROFYSIKK



SIZE RANGE: 1 – 100 nm

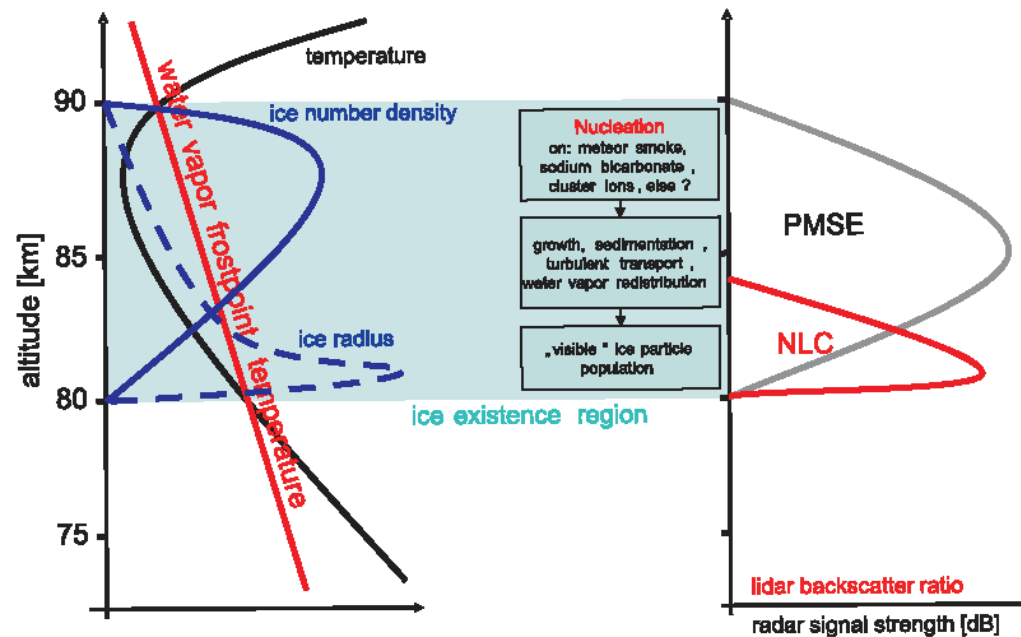


Fig. 1. Schematic summarizing the morphology of a mesospheric ice cloud and the most important contributions and processes during its evolution. The right part of this figure indicates that only the largest ice particles at the bottom of the ice particle layer become visible as NLC, whereas the whole layer modifies the ambient plasma of the D-region and hence gives rise to intense radar echoes called PMSE.

# VITENSKAPELIGE MÅLSETNINGER

- Bestemme tetthet og høydefordeling av meteor-røykpartikler i den midlere atmosfære
- Bestemme ladningstilstanden hos røykpartiklene og identifisere den dominerende ladingsmekanismen
- Klargjøre rollen til meteor-røykpartikler som kjernepartikler i dannelsesprosessene for mesosfæriske ispartikler; dvs som basis for nattlysende skyer og polare mesosfærisk sommerekko
- Studere reaksjoner i eksisterende røyklag ved friske flukser av materiale under meteorskurer

# NYTTELAST

LENGDE NYTTELAST: 3.3 M

MAGIC

ECOMA

PIRANI

EP

PIP

FARADAY

CPP

EP

CONE

VEKT NYTTELAST: 215 KG

FFI



NESEKON

TOPPDEKK

GJESTE-  
SEKSJON

HK-SEKSJON

BERGINGS-  
SEKSJON

AKTER-  
DEKK

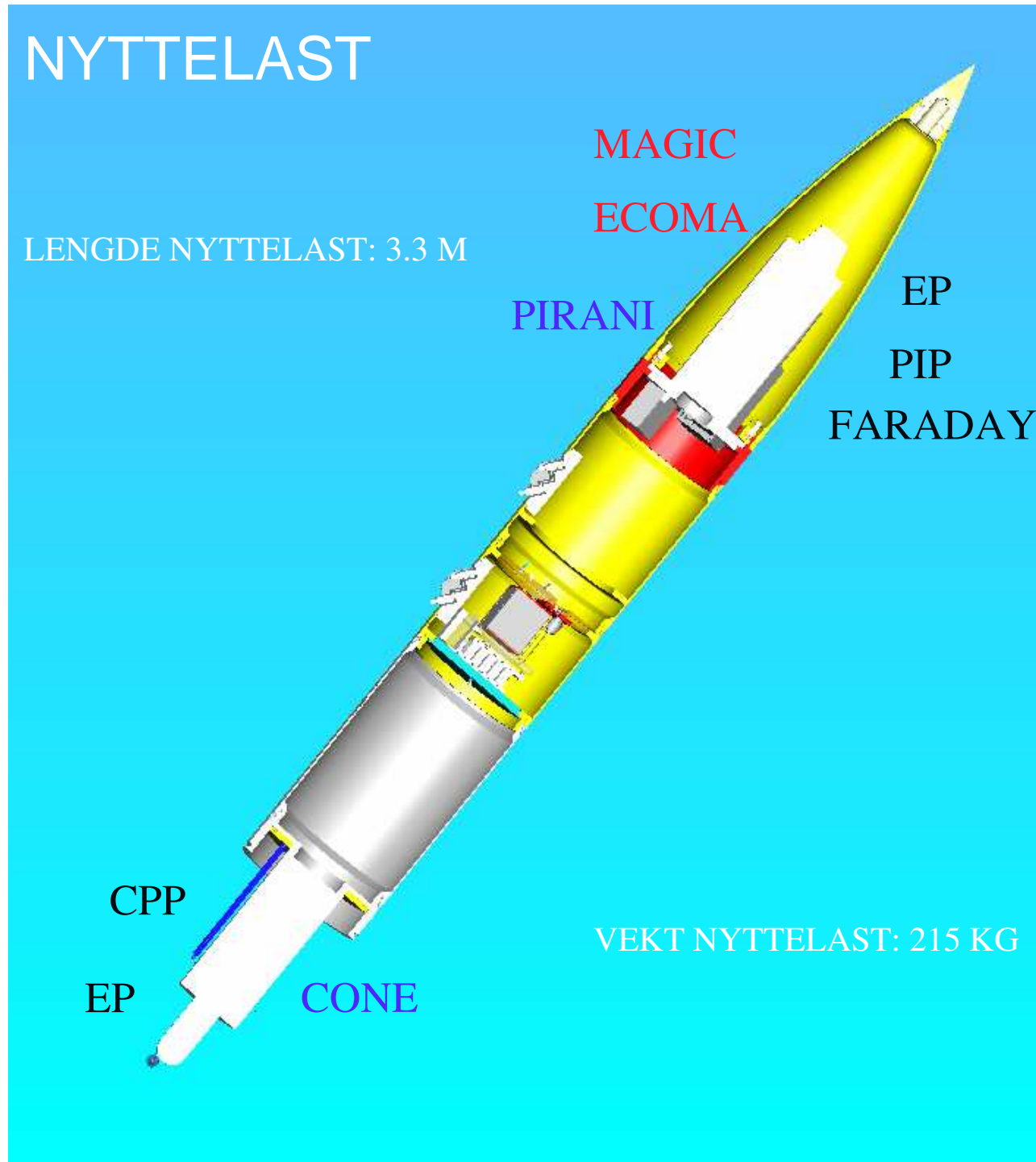
FFI

IAP

MISU

TUG

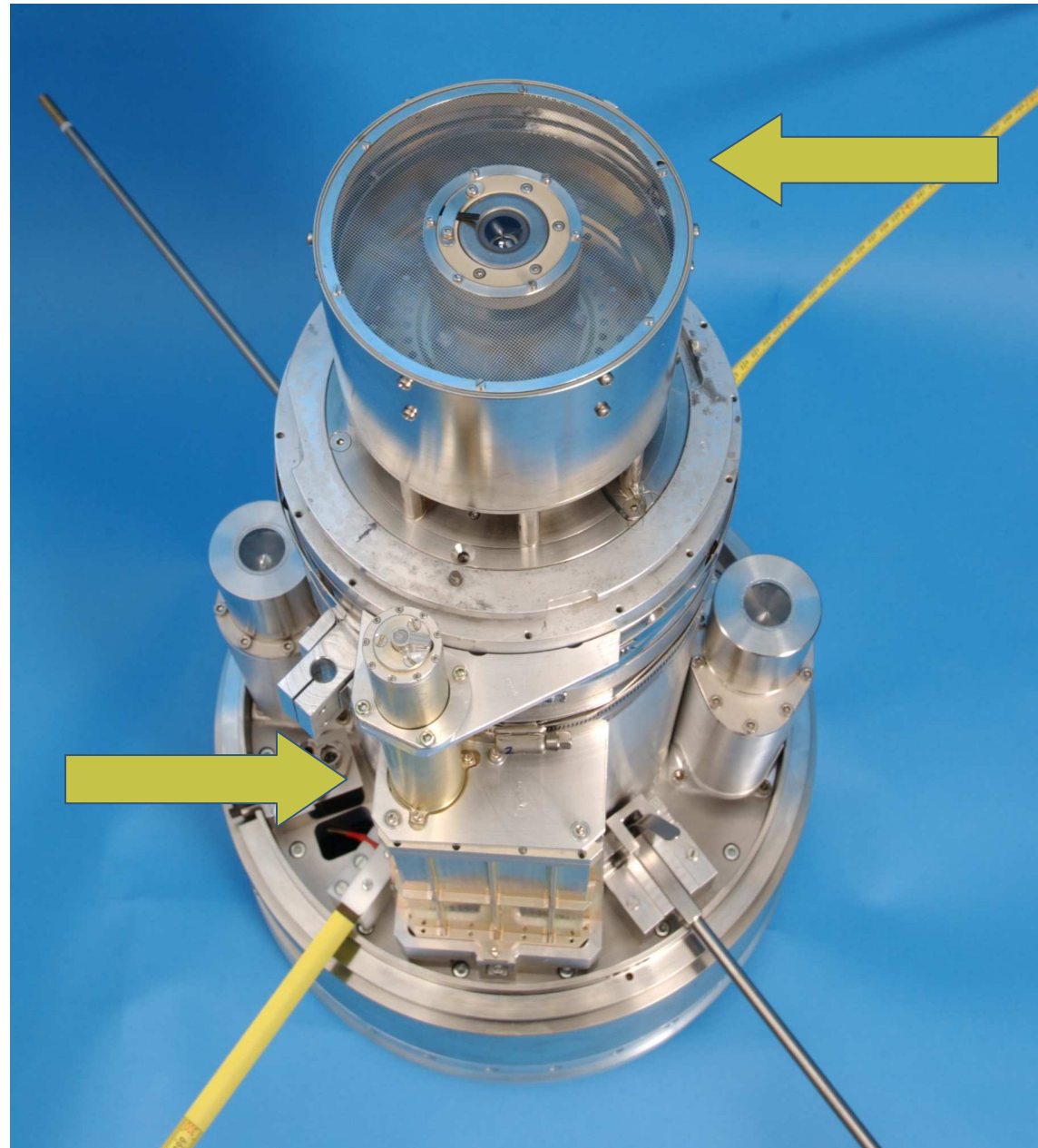
DLR



# MÅLING AV RØYKPARTIKLER

## MAGIC

- Collecting mesospheric dust in the region between 50 and 100 km.
- Anticipated nanometer size dust or smoke particles will impact and stick to the small collection surface.
- Pins are successively extended forward of the rocket's leading edge once the nose cone separates.
- The unit contains nine sampling pins, which allow for spatial distribution measurements of the dust along the rocket trajectory.



FFI

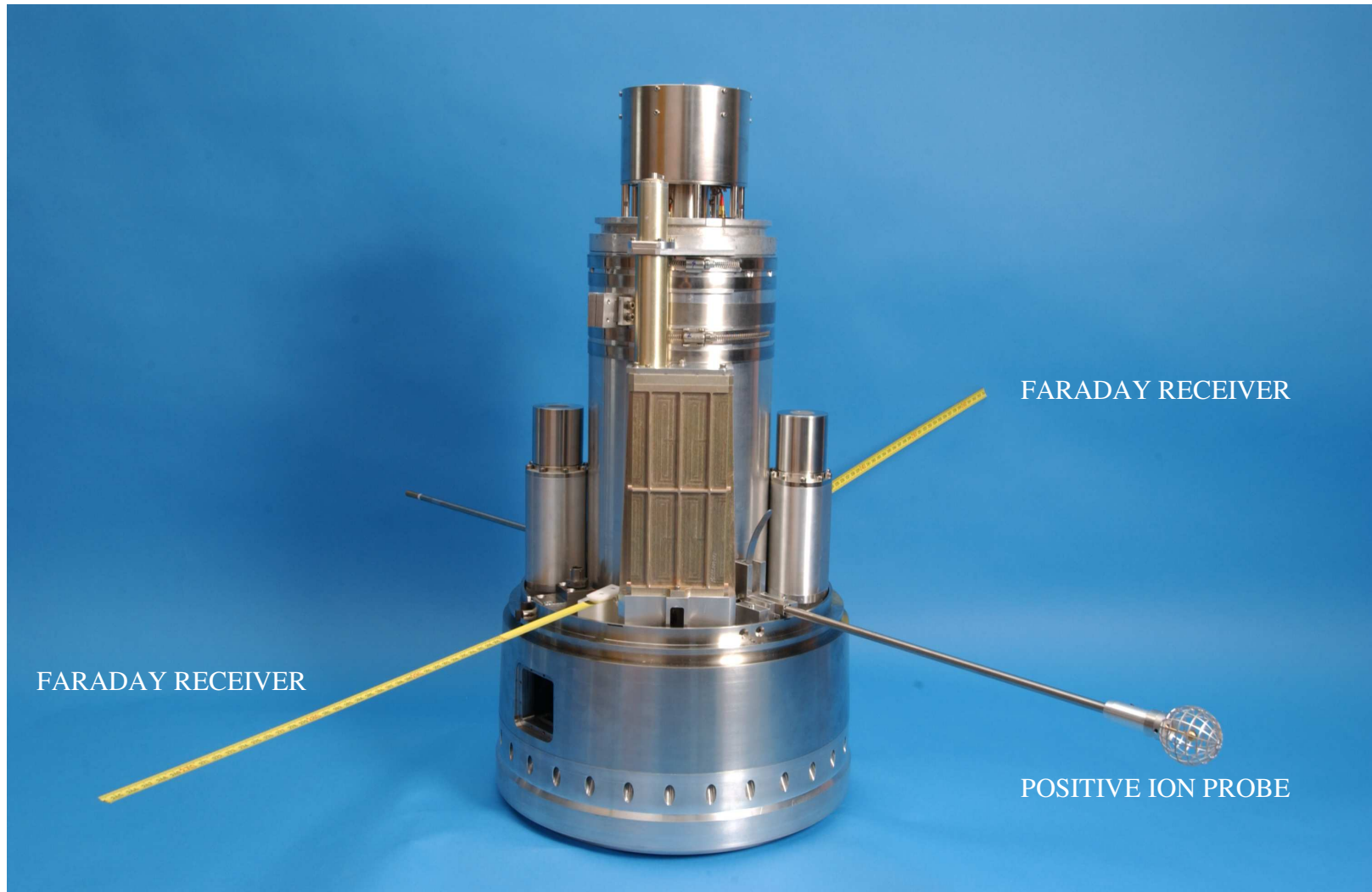


## ECOMA

- Measuring mesospheric dust in region between 50 and 100 km
- Anticipated smoke particles ionized by UV-flash
- Continuous monitoring through current measurement
- Screening out of ionosphere by charged grids

# PLASMAMÅLINGER

FFI



FARADAY RECEIVER

FARADAY RECEIVER

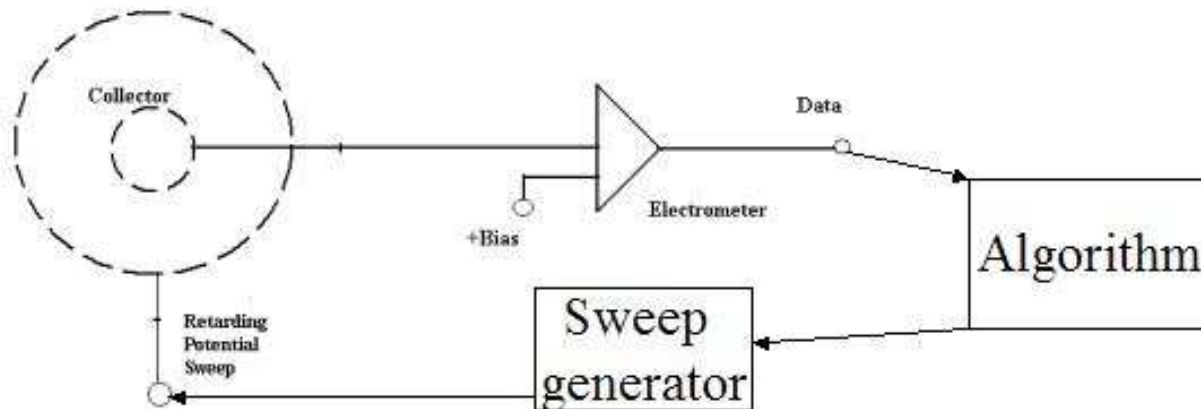
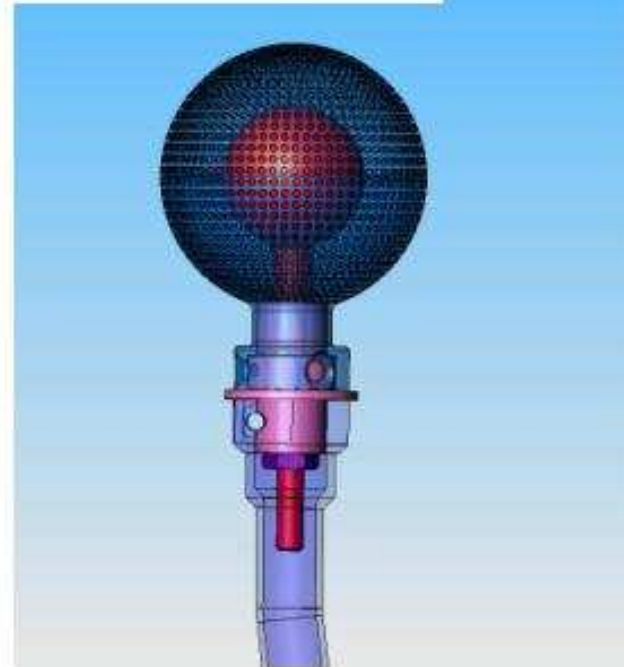
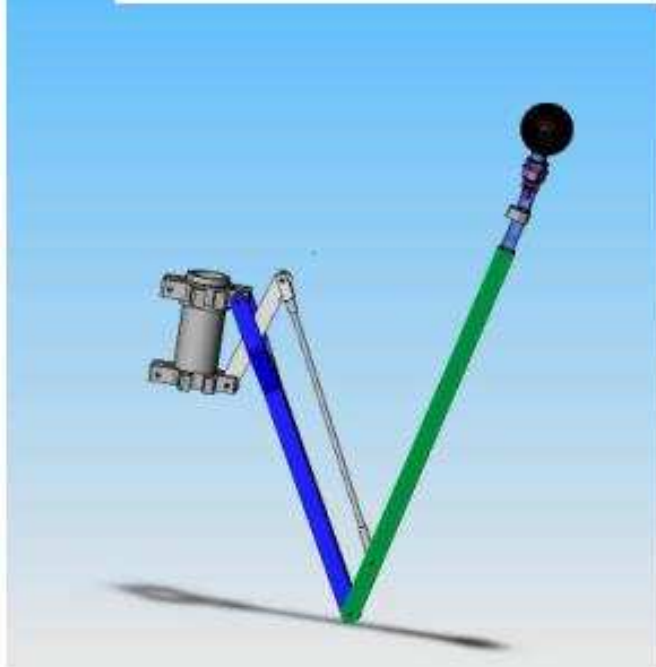
POSITIVE ION PROBE

ABSOLUTT PLASMATETTHET

LADNINGSLIKEVEKT

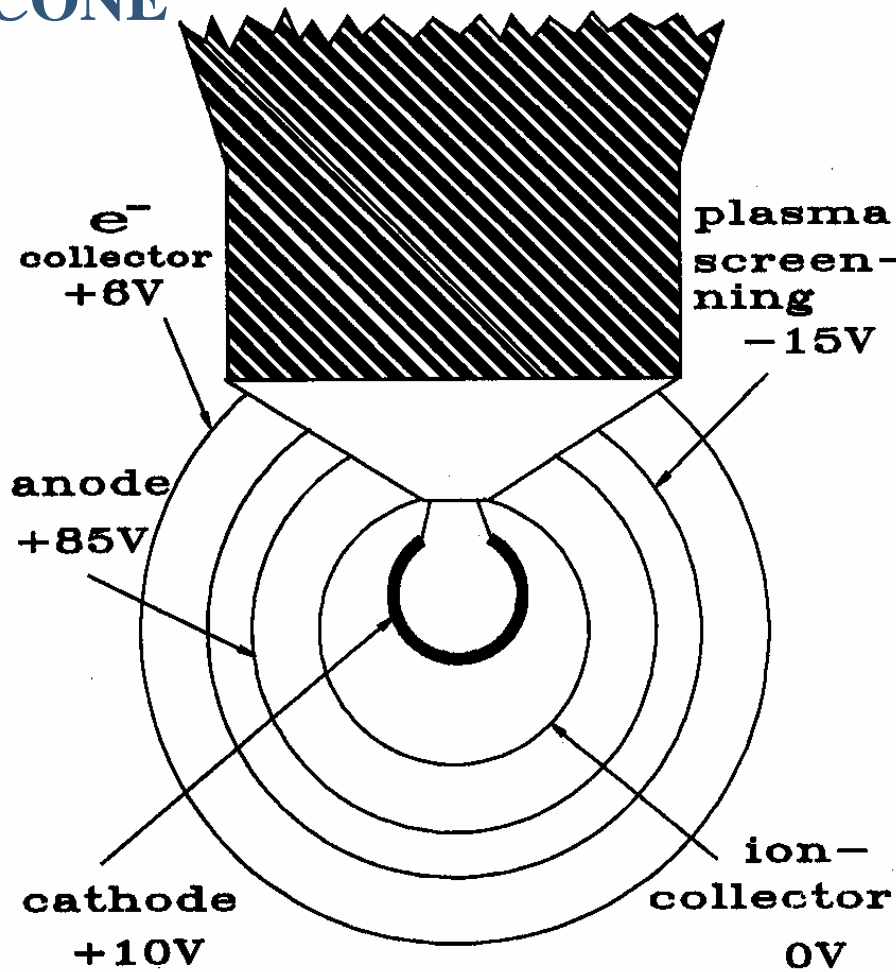
# CPP

Auto-corrective probe mounted on deployable boom



$$I(V) = I_o \cdot e^{-\frac{eV}{kT}}$$

# CONE



The pressure profile is estimated from the expression:

$$P(z) = P_0 - \int_{z_1}^{z_2} \sigma g dz$$

The temperature is obtained from the ideal gas law:

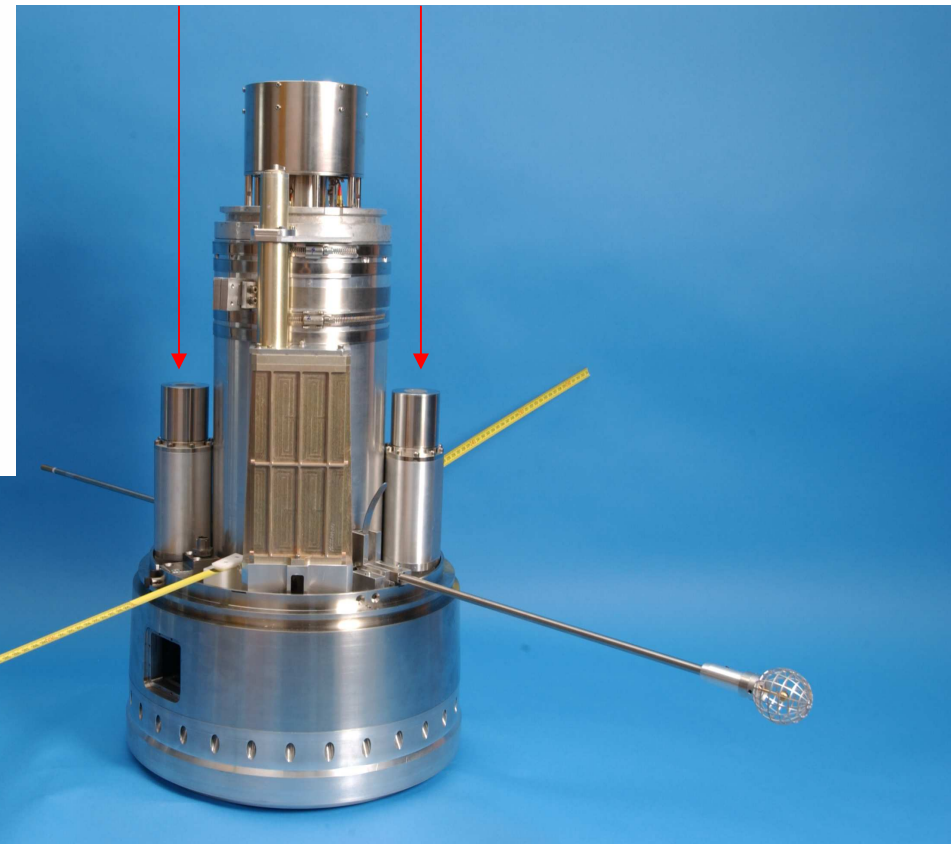
$$T(z) = \frac{1}{R} \cdot \frac{P(z)}{\sigma(z)}$$

An iterative procedure used to obtain the best results.

# PIRANI



- Based around a heated wire having an electrical resistance proportional to its temperature.
- Gas molecules collide with the wire and remove heat energy from it (effectively cooling the wire). As gas molecules are removed there are less molecules and therefore less collisions. Fewer collisions mean that less heat is removed from the wire and so it heats up. As it heats up its electrical resistance increases.
- A simple circuit utilizing the wire detects the change in resistance and once calibrated can directly correlate the relationship between pressure and resistance.



# BAKKEINFRASTRUKTUR

FFI

