Space Simulation Chamber (SSC) for space instrumentation testing in Tromsø.

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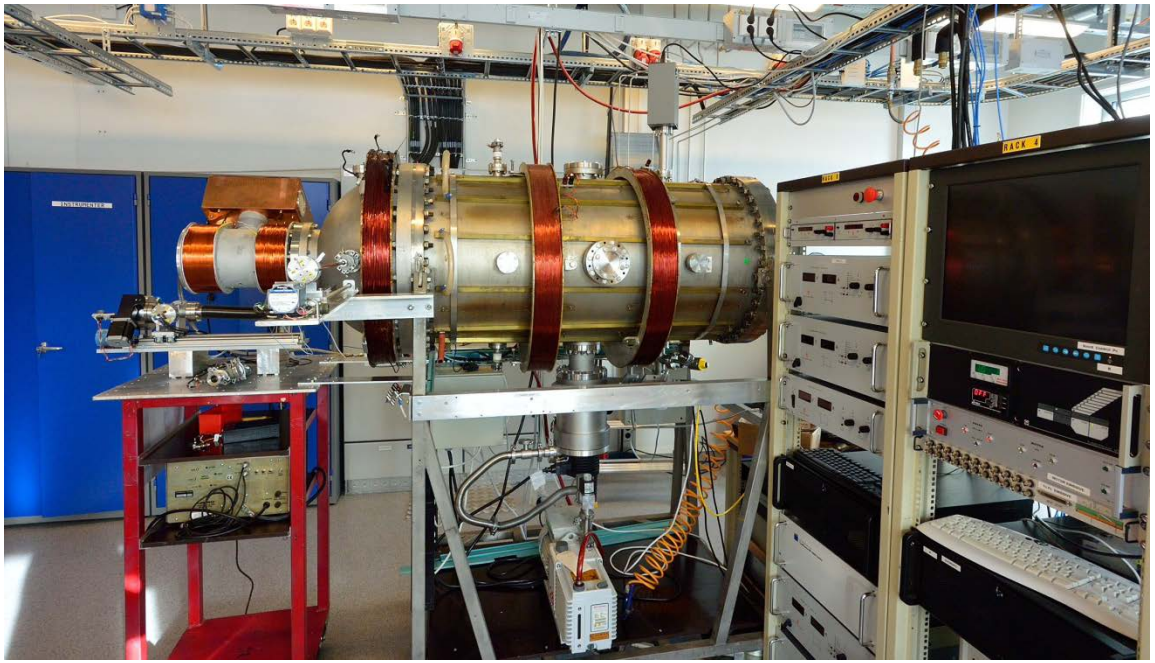
UiT / THE ARCTIC UNIVERSITY OF NORWAY

DPT has moved into new building in main campus in Tromsø

Technology building, main campus

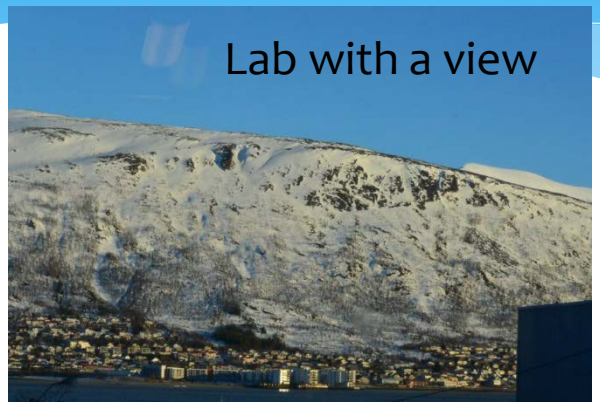
Auroral Observatory near Prestvann

New building – new lab



Moving the plasma laboratory into a new location

New horizons – new development - the Space Simulation Chamber (SSC)



Formerly at Norwegian Defense Research Establisment (NDRE) – now at Aurolab

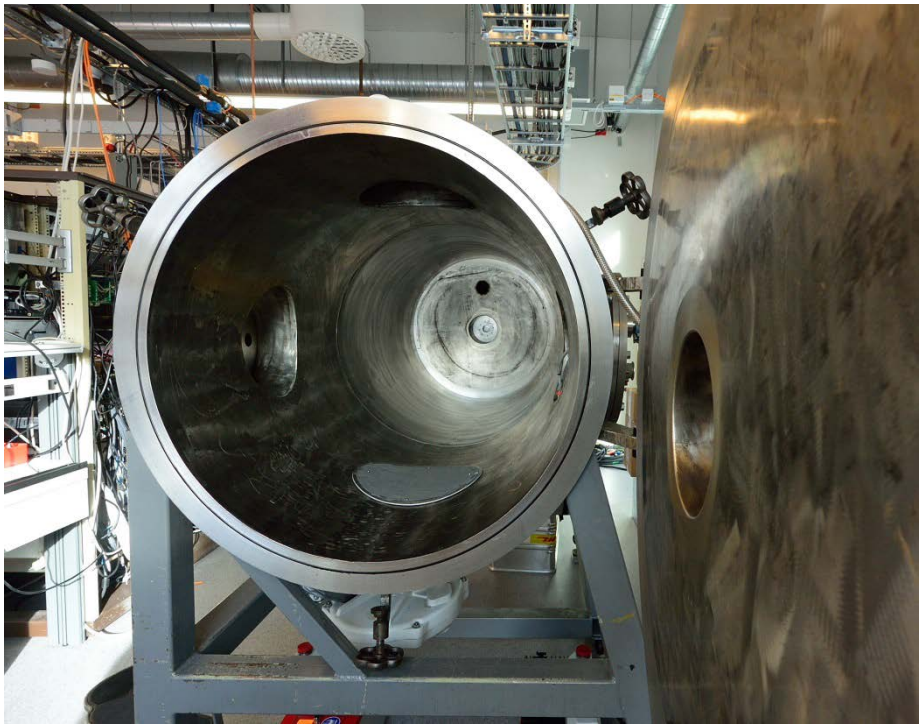
Purpose:

To serve as development and vacuum test facility for rocket and satellite payloads and instrumentation

To simulate plasma environ- for space vehicles and plasma propulsion development

Some features

- Easy access through large doors
- Dimensions:
  - Length 2,0 m
  - Diameter 0,9 meter
- Refurbished and equipped with
  - 2x (**HiPace 800, 790 l/s turbopumps** and Pfeiffer Penta 35 backing pump)
    → Fast pumpdown time
    (Estimated to 10^{-5} mbar: 50 min
  - Kaufman plasma source
    → 'Space' plasma flow around instrumentation



The vacuum system with gauges

Pressure gauges:

Capacitance manometer
$1x10^{-1}$ til $1x10^{-5}$ mbar

HV combined
Cold cathode / Pirani

Pirani fine vacuum

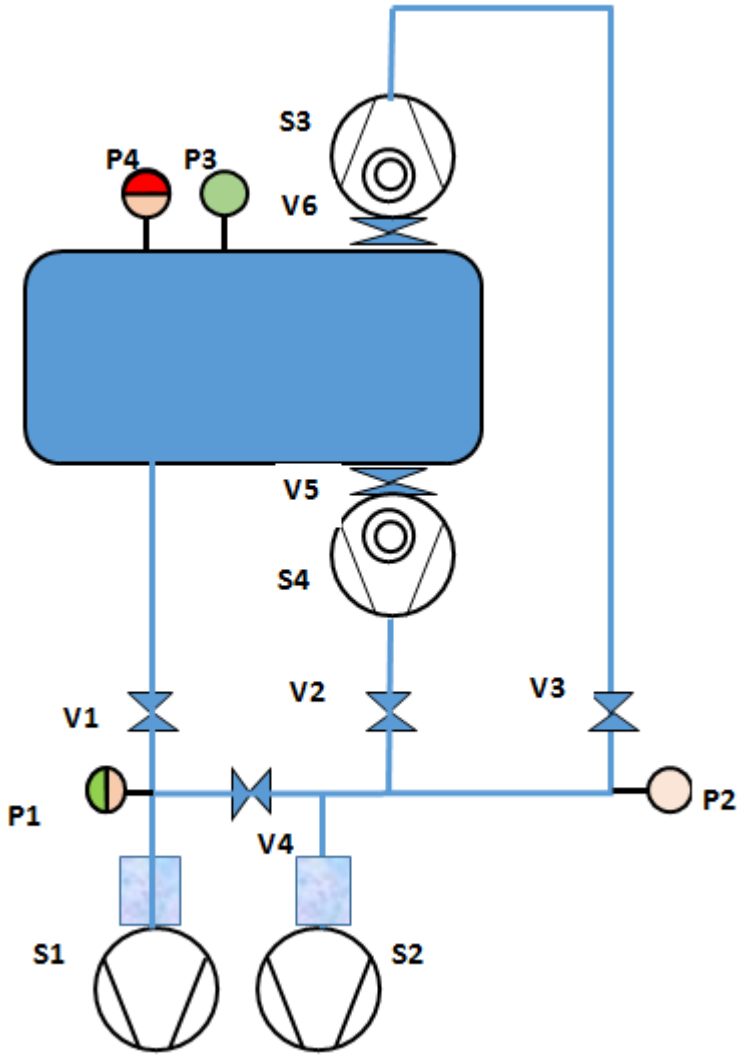
Fine / coarse vacuum
Pirani / Piezo

P1 Coarse vacuum during pumpdown from 1 atm.
Control S1, when V1 and V4 closed.

P2 Monitoring forevacuum for turbo
Control S2, when V2, V3 and V4 closed.

P3 Capacitance vacuum gauge

P4 Combined pirani/cold cathode
(entire pressure range)

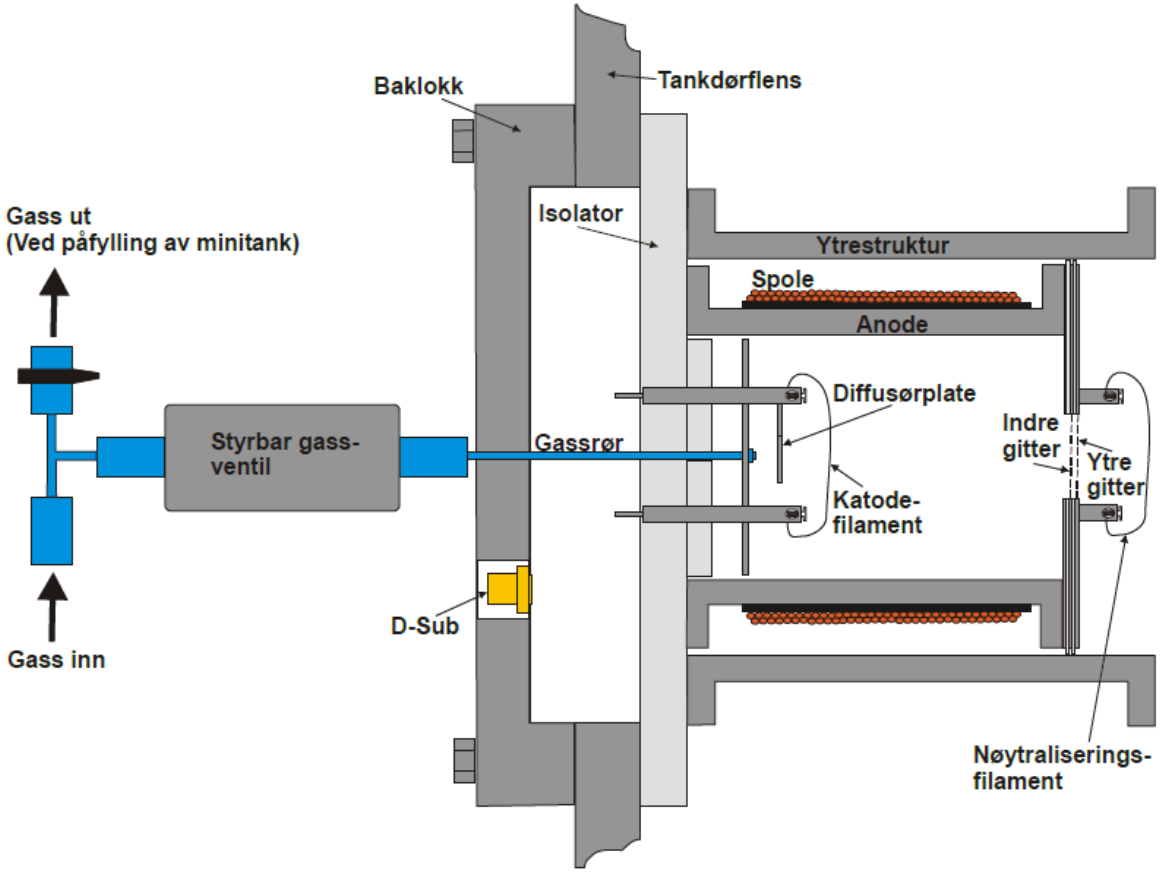


Present status of vacuum system

* Vacuum chamber cleaned and assembled
* Pumps, valves, and vacuum gauge systems delivered. Modified big ports delivered by end of June.
* Pumpdown by backing pumps only tested. Pressure of 10^{-2} mbar reached in 1 hour
* Early August: Vacuum system with turbo pumps mounted and tested.

Kaufmann plasma source

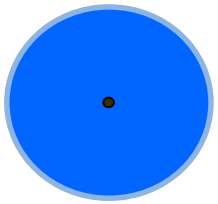
New plasma source was assembled at NDRE but never used. To be mounted and tested next semester.



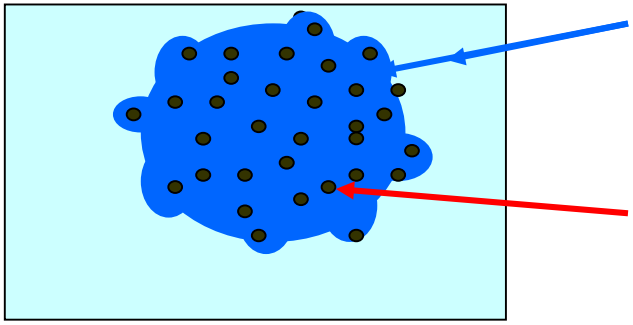
First instrument being tested(Havnes): a rocket born mass spectrometer (ICON)

Question: What is the origin of dust particles forming condensation nucleii of ice crystals in the mesospheric noctilucent clouds?

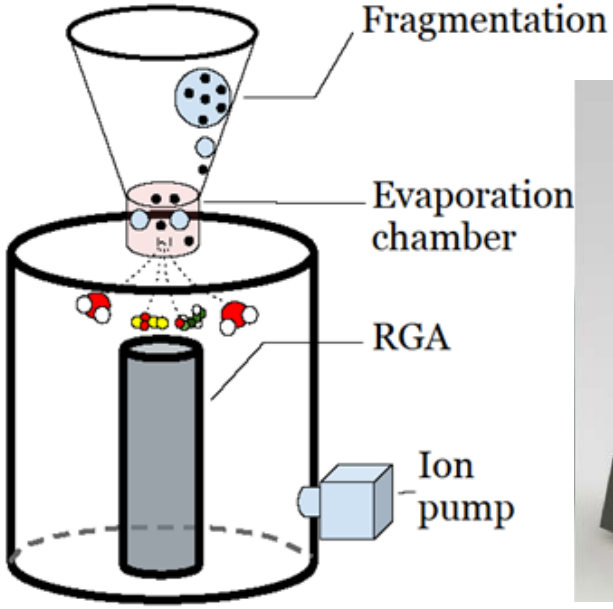
"Earlier" model for icy dust.

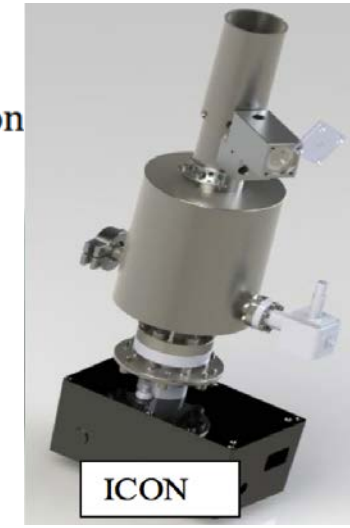


Havnes' model, from previous studies:



Building rocket-born mass spectrometer probe:





Future possibilites with SSC

- Offer payload testing for rocket experiments launched from Andøya (ICI, Canorock, MaxiDusty…)
- Collaboration on instrument development for rocket and small satellite payloads, e.g. Cube-sat.
- Development of small plasma thrusters for 'mikro'-satellites and accurate thrust measurements.
  SSC unique regarding size an access to be able to test thrust from propulsion sources *inside* vacuum and '*space*' plasma.

Thanks to NDRE,Technology building funds for scientific equipment and NFR project funds allowing this project to ‘fly’!

…and thanks to the audience!