



EXOSAT IMAGING OPTICS

1975 – 1983

Piet de Korte



Netherlands Institute for Space Research

ESOSAT INSTRUMENT TEAM

Captain – Brian Taylor

1st officer – Rainer Zobl

Mechanics – Robert Lainé – Dieter Bock

Electronics – Hans Eggel

Ground Support Equipment – Dave Andrews

Test assistant – Robert Giralt

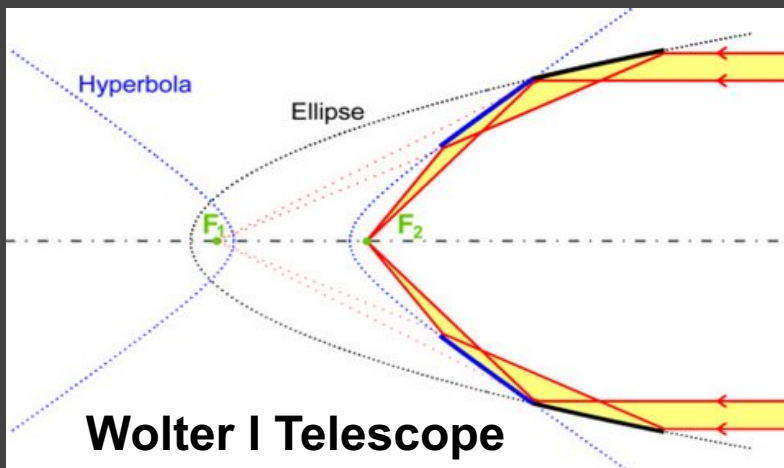
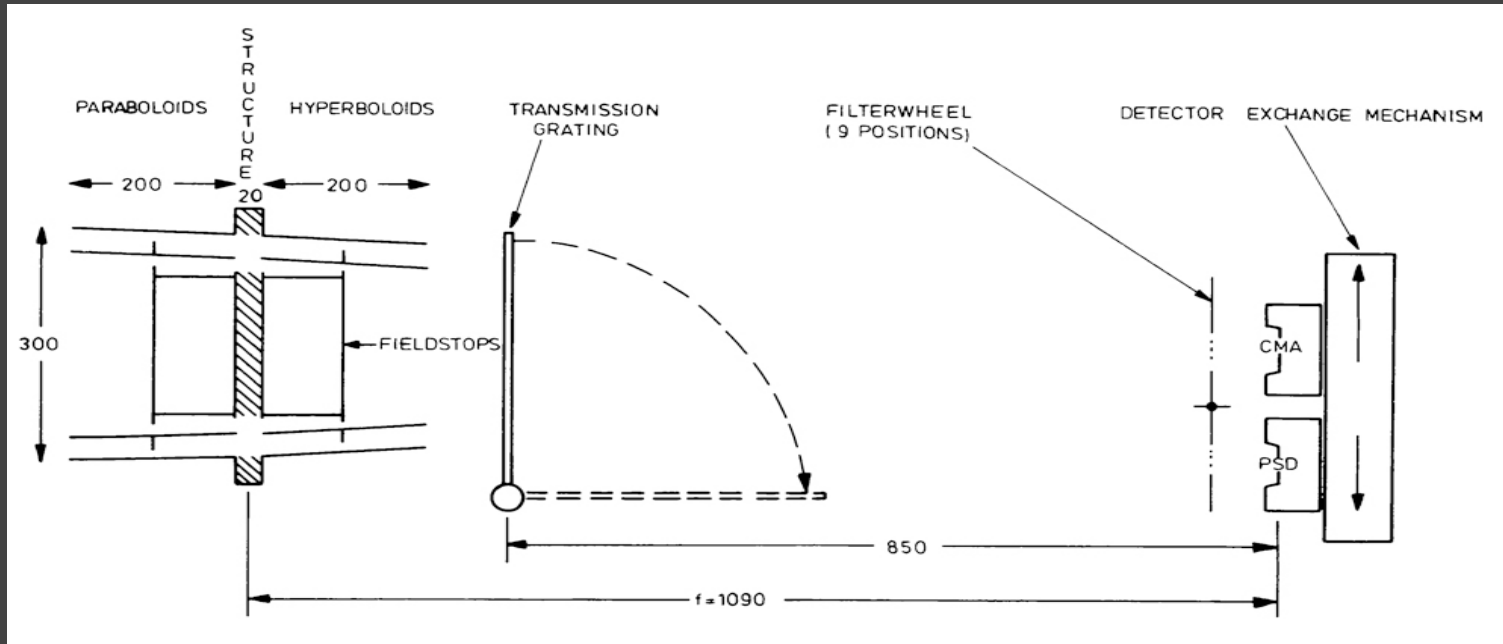
Competent team, but young and “wild” with interests as diverse as: car racing, hunting, mountainclimbing, drinking, eating and women.

It was great fun!!!!



Netherlands Institute for Space Research

Low Energy Instrument



- Wolter I Telescope (Bleeker/Leiden)
- Transmission Grating (Brinkman/Utrecht)
- Imaging Proportional Counter (Ives/MSSL)
- Imaging Channel Multiplier (Ives/MSSL)
- Mechanisms (Lainé-Bock/ESA)

EXOSAT X-ray Optics

Wolter I telescope

- Outer diameter 0.3 m
- Overall length 1.3 m
- 100 cm² effective area at 1 keV
- 15 arcsec spatial resolution
- < 7kg/telescope
- Be-carriers
- Epoxy **replication** from BK7 glass mandrels

Industrial Consortium

- CIT Alcatel (Frindel & Coste/Annecy & Ernu/Paris)

Be-shells and metrology

- J. Fichou (Contet/Fresnes)

BK-7 mandrels

- Jobin Yvon (Flamand/Jongjumeau)

Epoxy replication

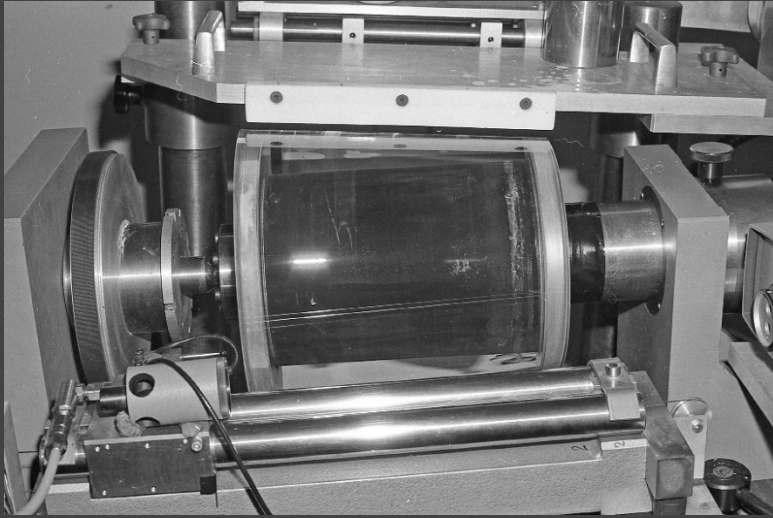


ESA: Robert Lainé, Robert Giralt and Dieter Bock

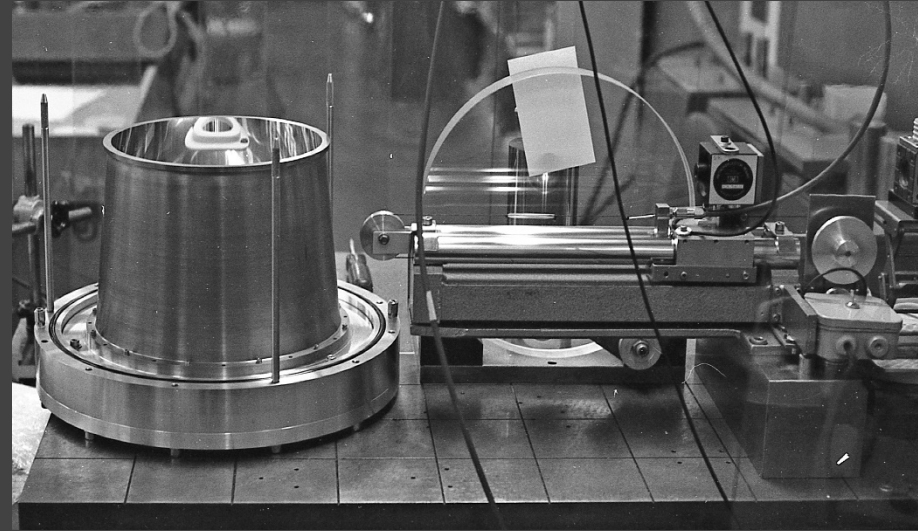
Calibrations/Measurement facilities

- Reflectivity (Leiden)
- Scattering (Tübingen/Leiden)
- Spatial Resolution
 - Martin Marietta (Denver)
 - MPE Panter (Neuried)

Production and Measurement



BK-7 Glass mandrel on polishing machine.
In front profile measurement system at
Fichou



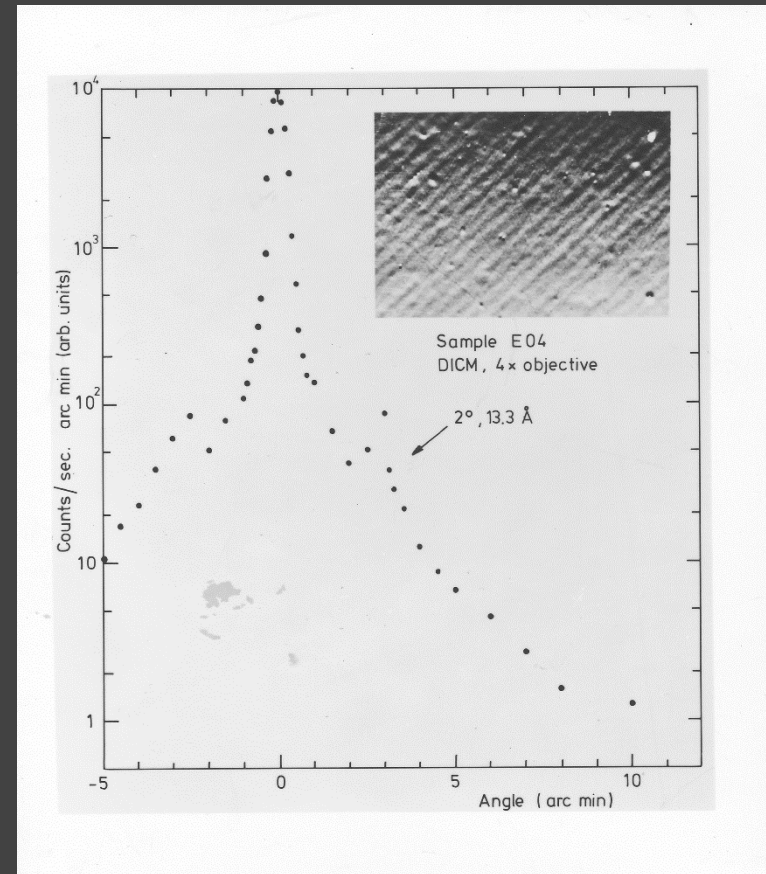
Similar profiler to measure shells with
sub-micron accuracy over 20 cm length
at Alcatel/Annecy



Filling the replication
equipment with epoxy
at Jobin Yvon

X-ray scattering and surface roughness

- Specification < 0.5 nm rms
- First X-ray scattering measurements at Astronomisches Institut Tübingen (Heinrich Bräuninger)
- Further measurements in a facility at the Cosmic Ray Working Group in Leiden (Leo de Jong)
- Nomarsky Interference Microscopy at polishing machines of J. Fichou and for inspections at Jobin Yvon (Robert Lainé)



Optical Integration and Image measurement

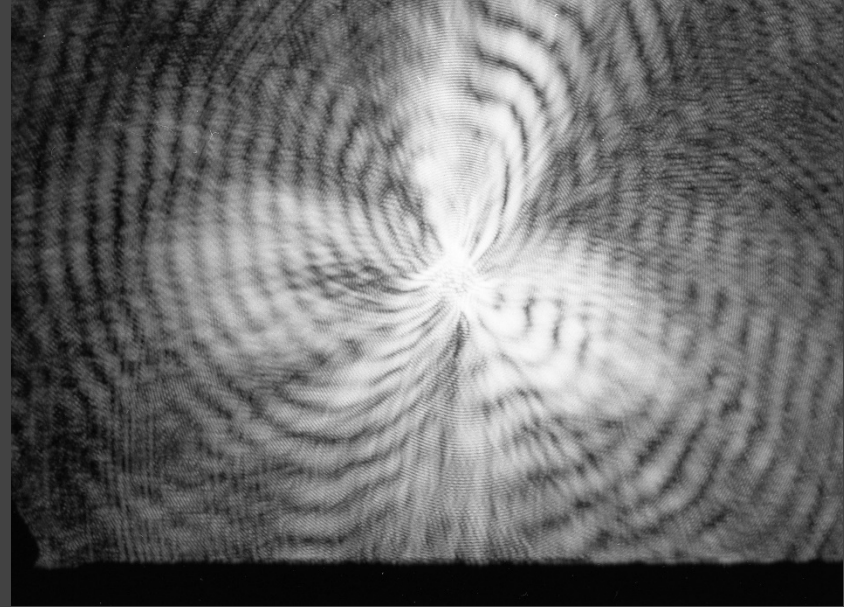
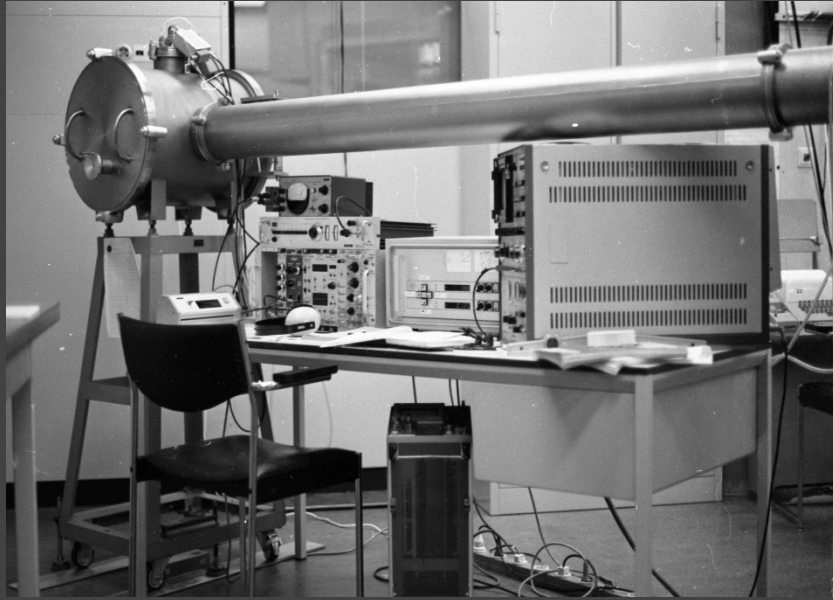


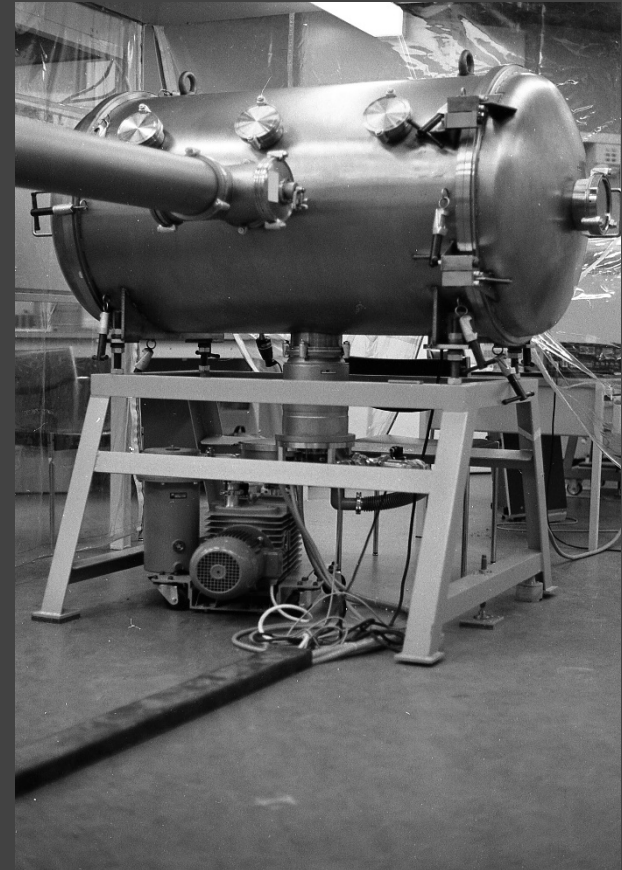
Image quality (typical 10 – 15 arcsec)
limited by mechanical distortions due to
clamping the shells to the central flange.

Non-clamped shells as good as about 5 –
10 arcsec

Test facilities for X-ray Scattering and Reflectivity Leiden



Measurement Chamber
with
Scanning proportional counter



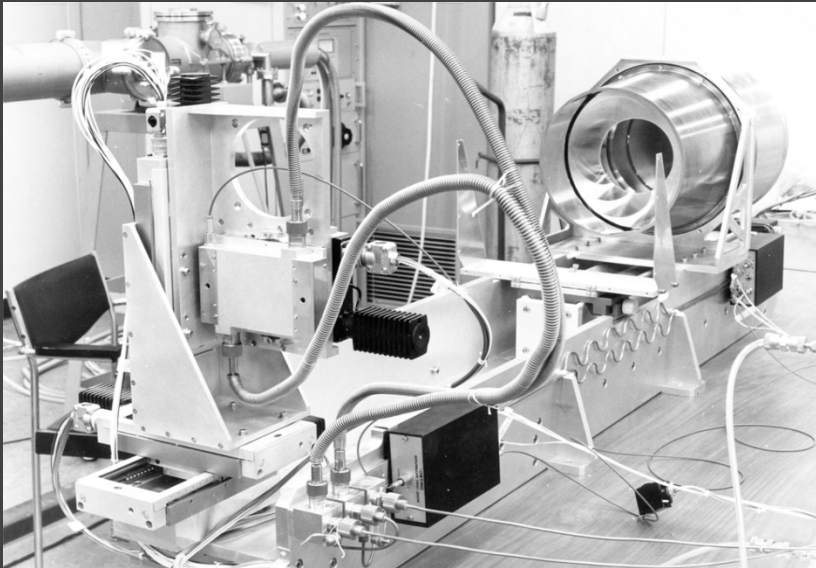
Sample Chamber
Samples and Full
mirrors

Leo de Jong did most of the measurements

X-ray Test facility at Martin Marietta (Denver) in 1978 and 1979



In winter snow and in summer snakes



3-axis image scanning with
slit-proportional counter

Martin Marietta 1978

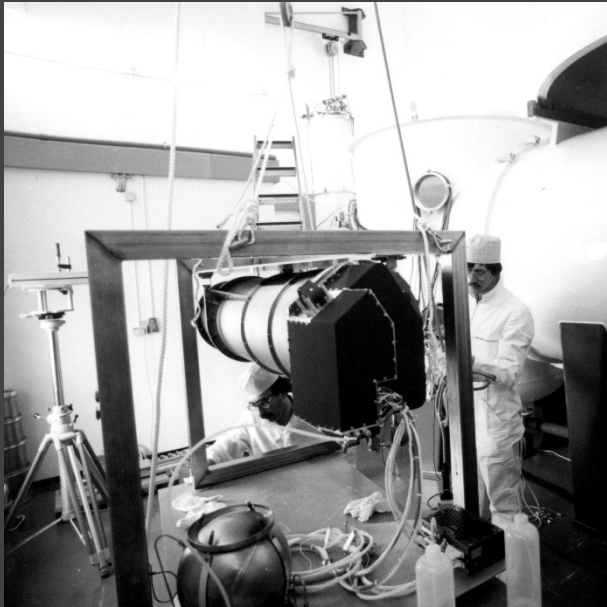


Robert Giralt, Piet de Korte, Bill Miles,
Frank van Rooijen en Joe Froechtenigt



Fair
Rodeo in Greeley

Tests at Panter/MPE in Neuried (1980 – 1982)



EXOSAT LE-instrument



Baumgartner, Heinrich Bräuninger, Robert Giralt and myself lowering the LE-instrument in the Panter facility



At this facility several of us spend a lot of time.

For me this was close to one year



Pantolsky/Panter Neuried



Pantolsky, ???, Heinrich Bräuninger, Leo de Jong,
Piet de Korte, Hans Eggel, ???



Piet de Korte
Hintertux Glacier
with
Robert Giralt

With Robert Giralt in his garden (mei 2017)

