

CIRMOS

4/26/2010

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About the name CIRMOS



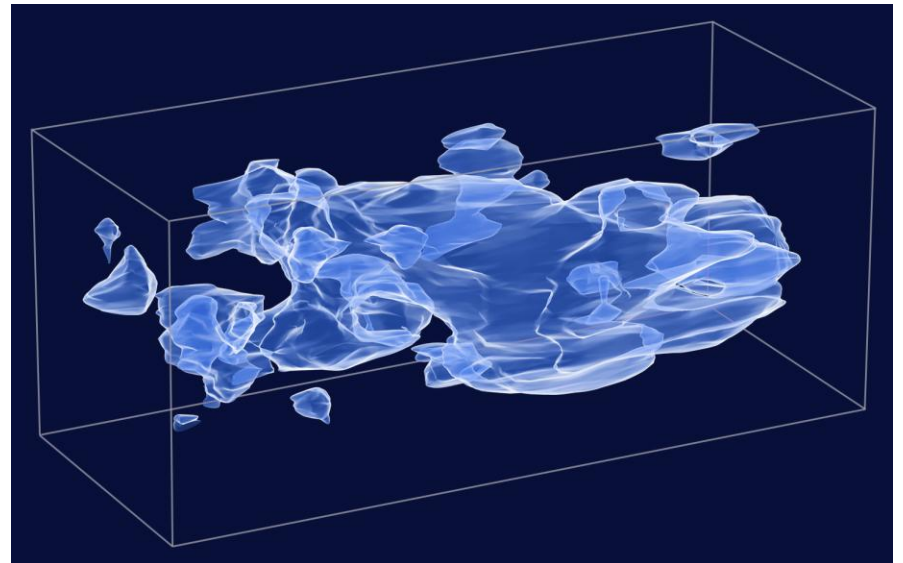
Thermos® -- Hot Matters. Cold Matters. It Matters.

How about Dark Matter?... **Does it matter?**

Does Dark Matter deserve an astronomy?

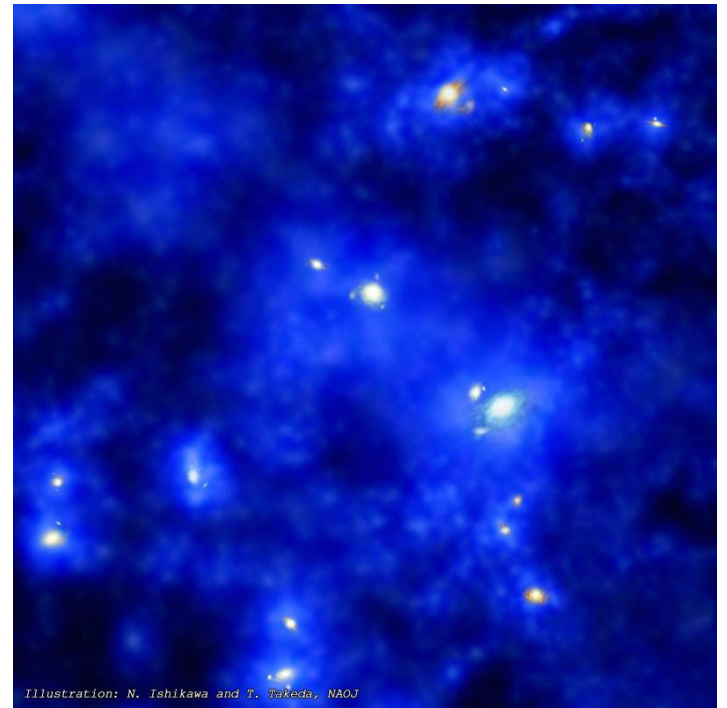
How to measure DM...

- CMB,
- Weak Lensing,
- Cluster statistical analysis...



How to measure DM

Virial Theorem, Keplerian motion, Rotation curves..... by measuring the velocity of whatever you can measure at a given distance



What drove ME to come up with CIRMOS?

- Pre-TMT Subaru... still more than 8 years!
 - Roadmaps for Optical, Exoplanets... are fine
 - Wide field IR... CIRMOS is a unique answer
- Contribution to TMT?...
 - by new technology... Raven, but CIRMOS, too
- In-House instrument R&D
 - is attractive to our engineering resources and
 - keep them competitive...
even after TMT project becomes active

- CIRMOS:

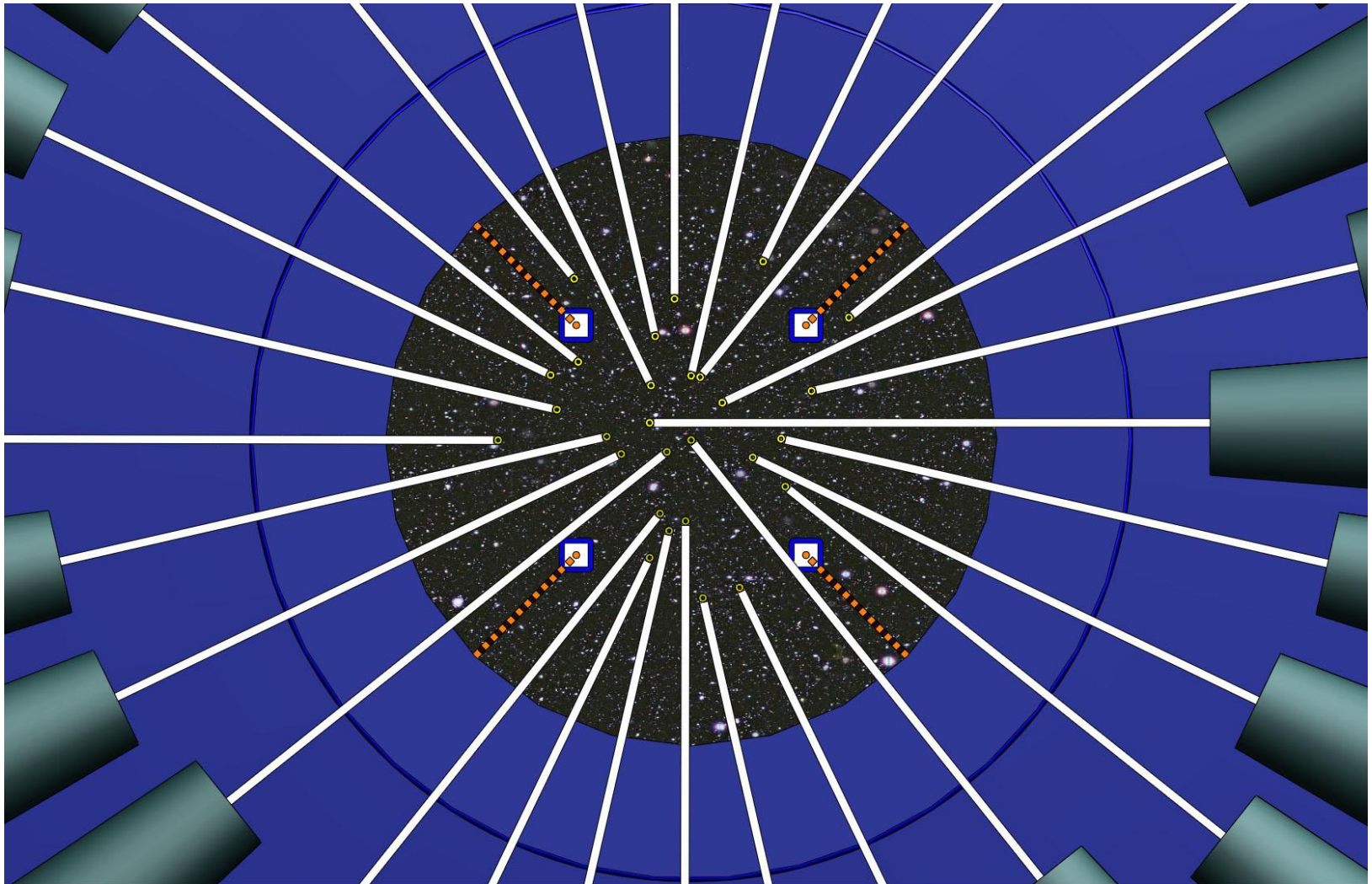
Conceptual IR Multi-Object-Spectrograph

- Concept for the last 2 years but not funded

- Myth I'd like to challenge... “No external fund, no observatory initiative”

- ...SIRMOS: Subaru IR MOS

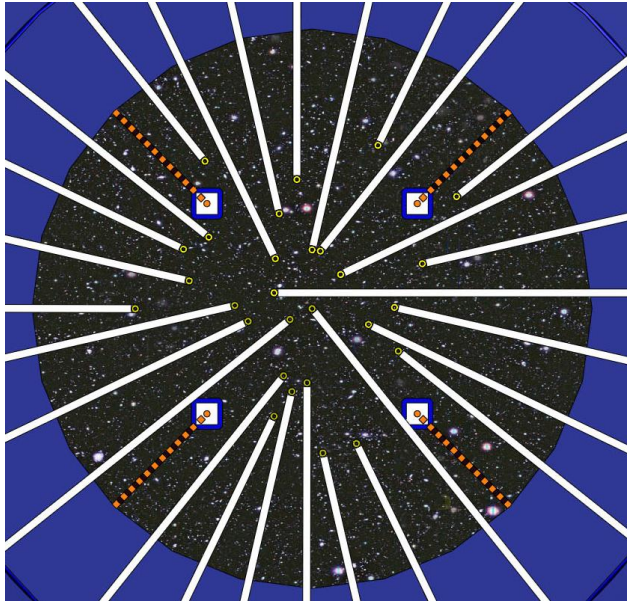
- Multi-Object Spectrograph



What is CIRMOS?

- Study of velocity map of a “cluster of galaxies”

gives...



Real maps of DM like this...

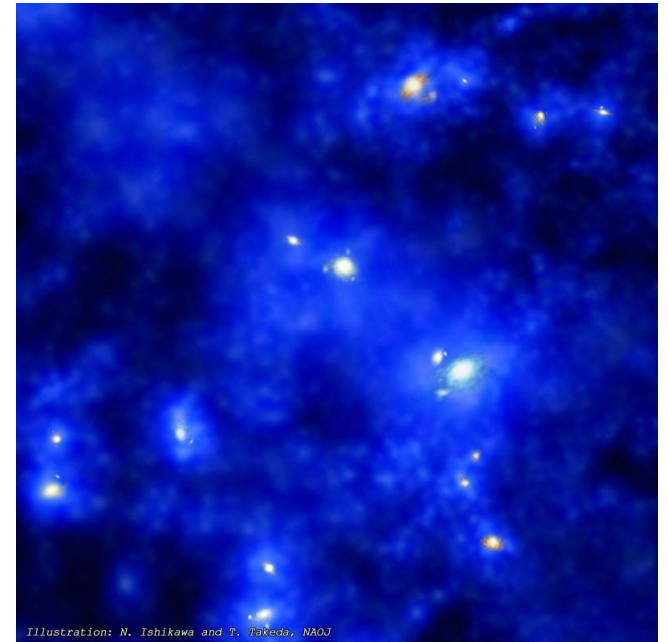
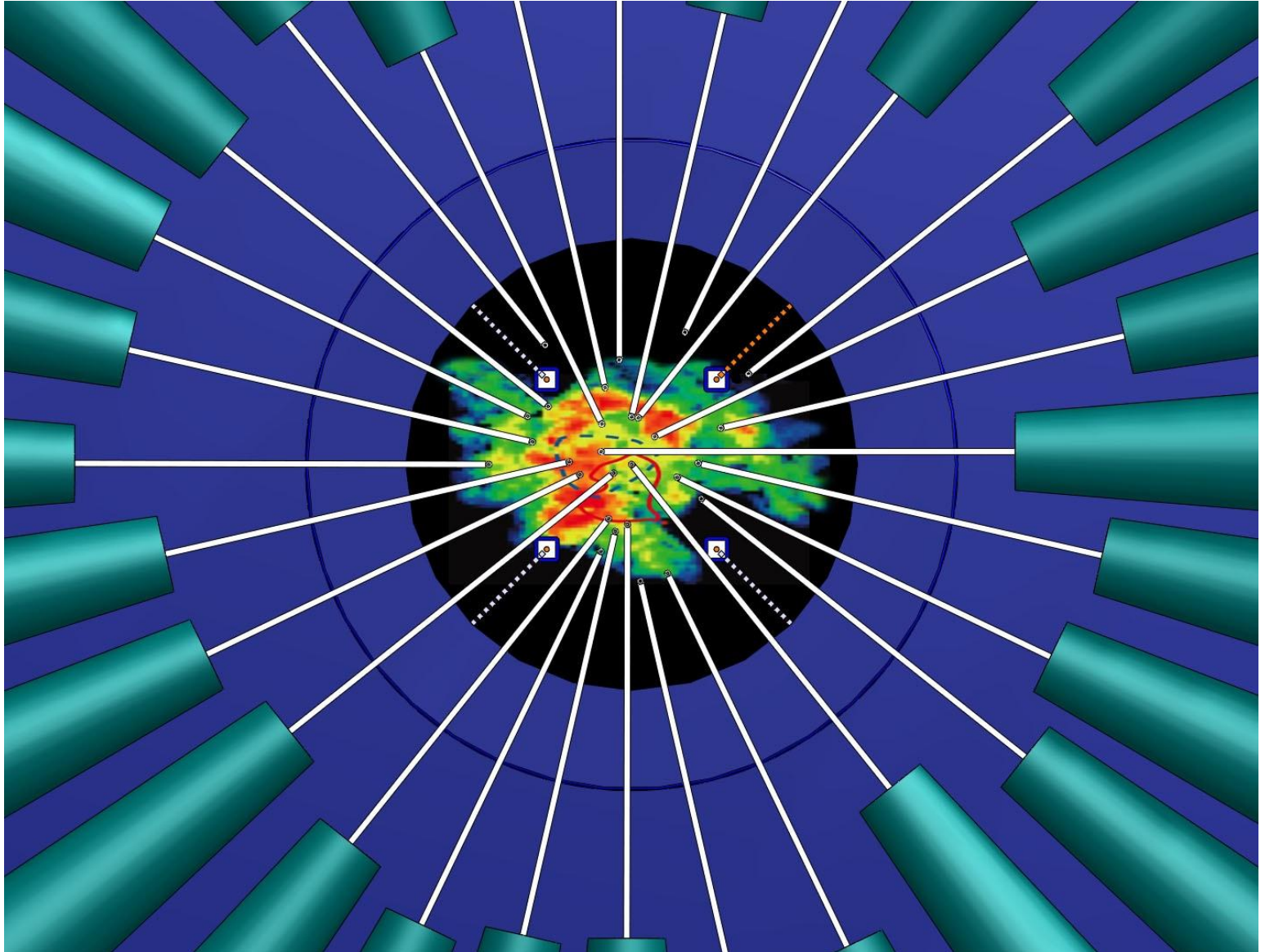


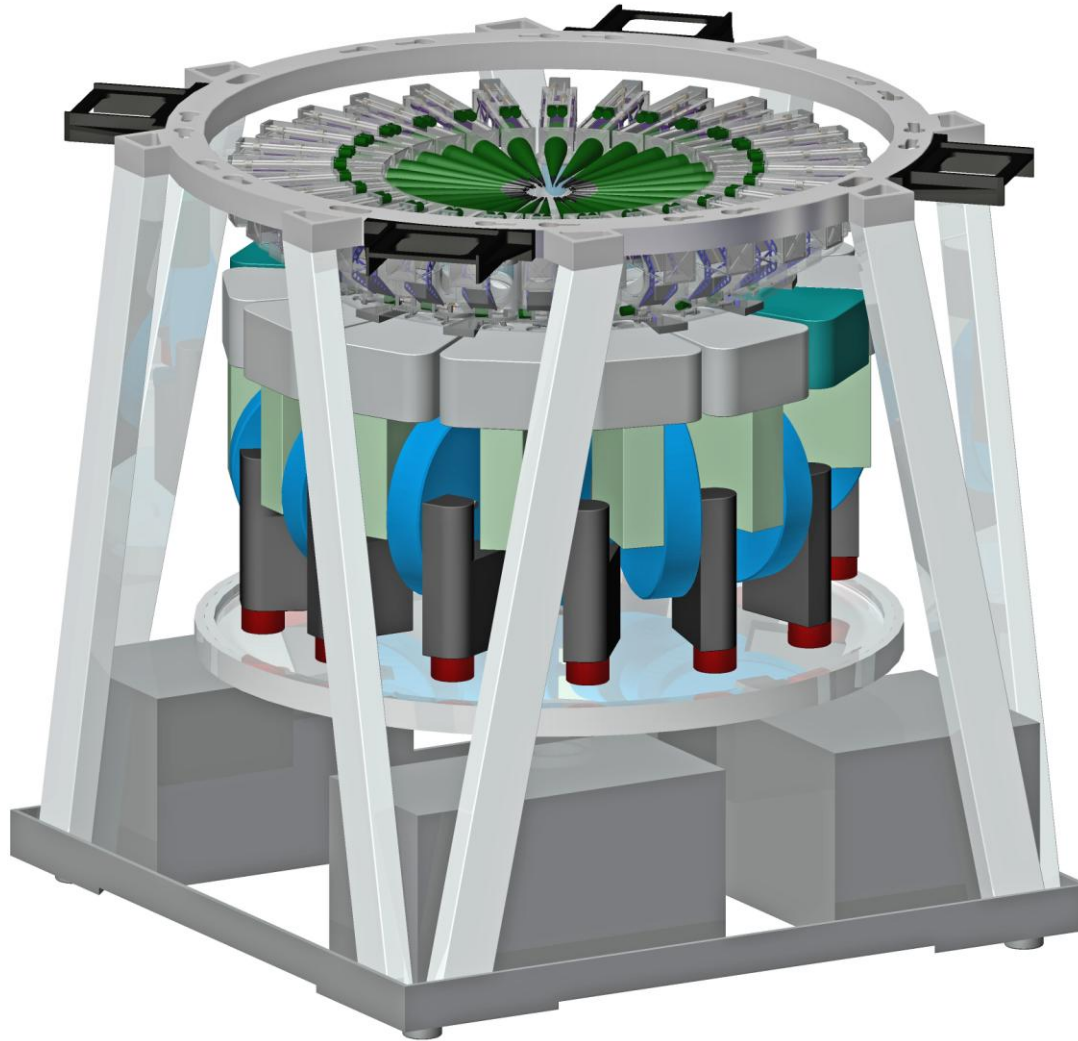
Illustration: N. Ishikawa and T. Takada, NAOJ

What is CIRMOS?

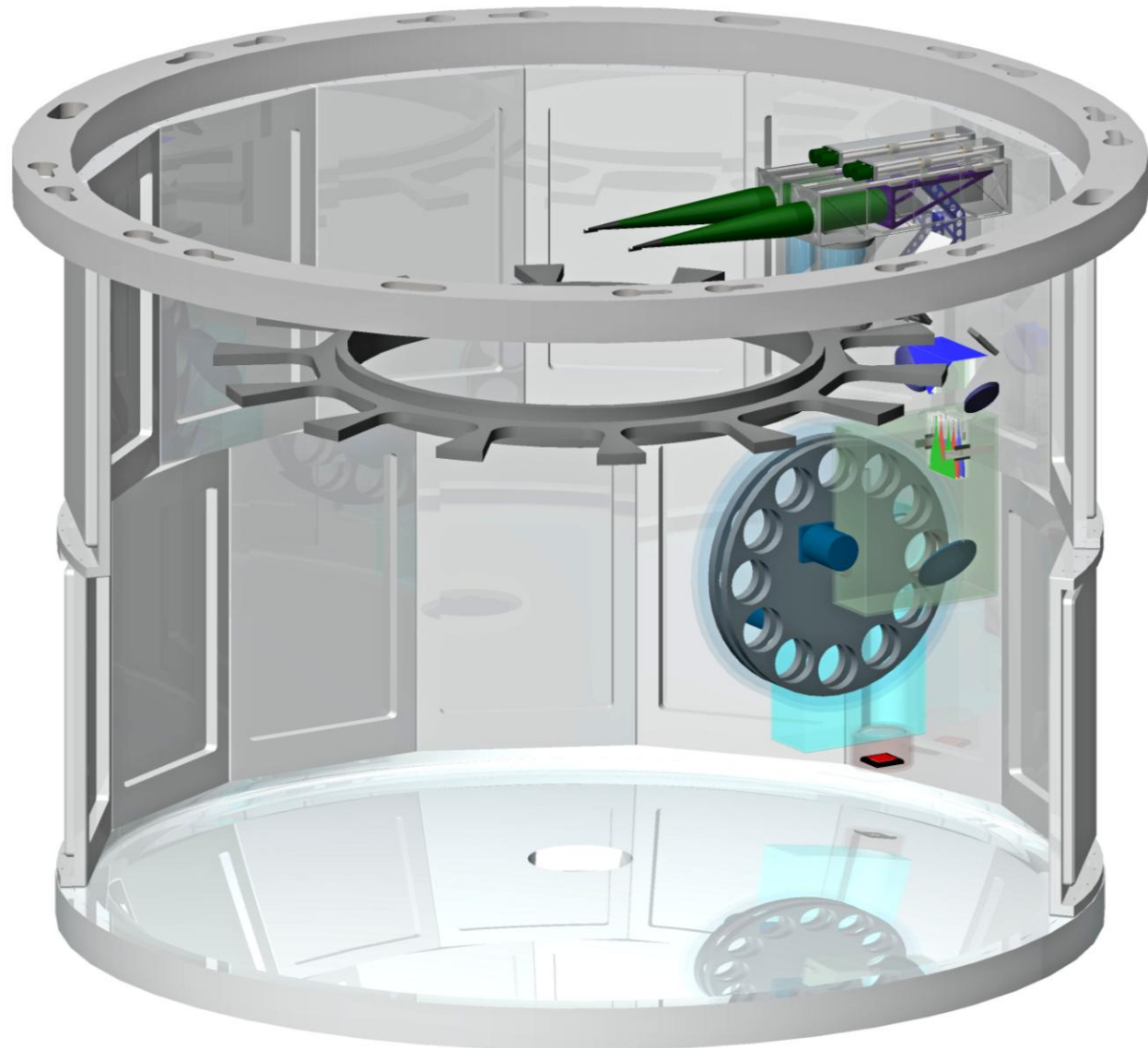
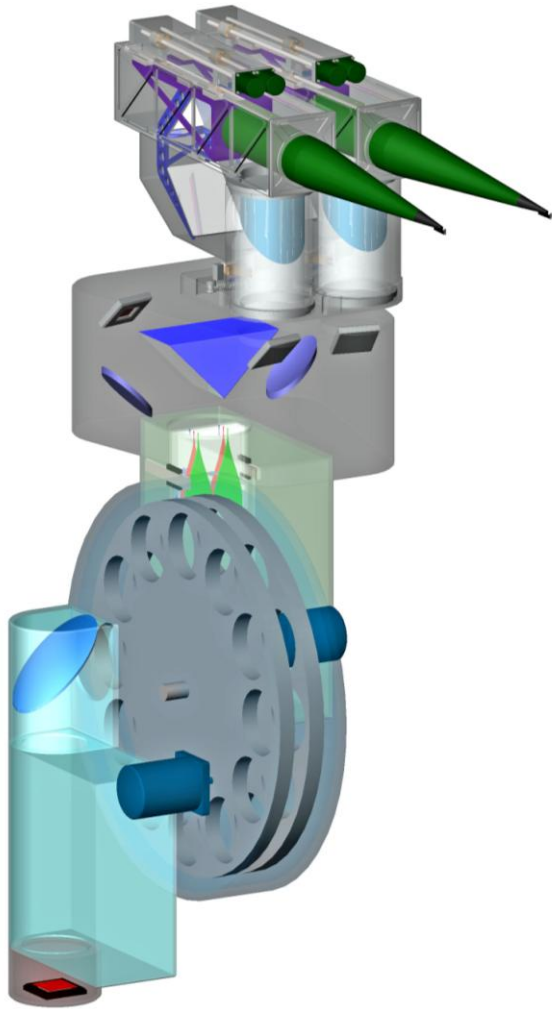
- MOS... for other clusters, too



What is CIRMOS?



What is CIRMOS?

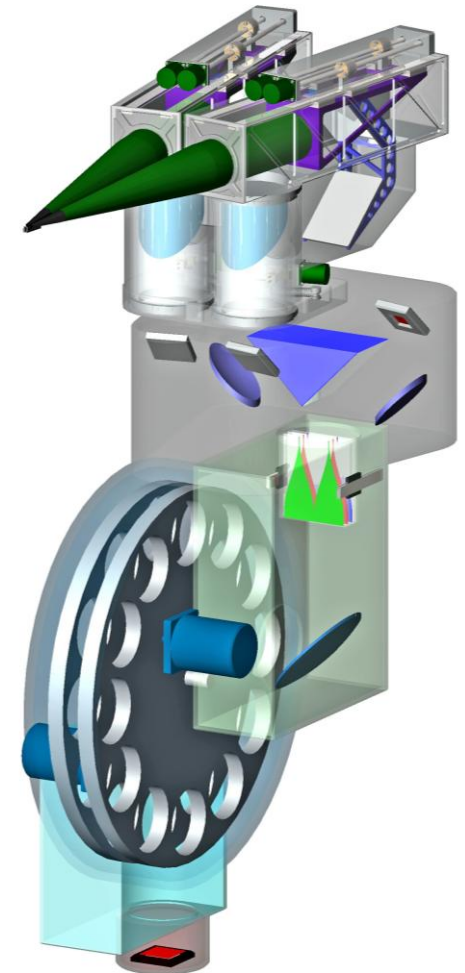
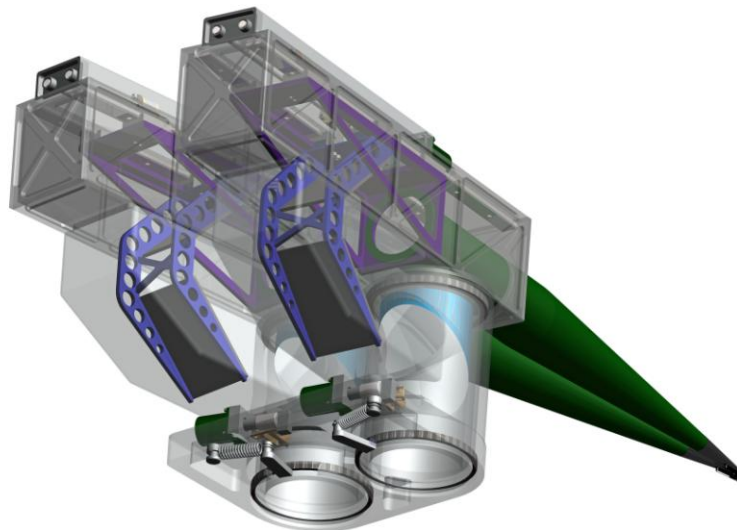


What is CIRMOS?

All Cryogenic for J, H, K

FoV Plan

Cassegrain 6 arcmin Field of Regard
28 Deployable IFU
IFU FoV diameter 2-3 arcsec
Unit AO controls each IFU FoV only



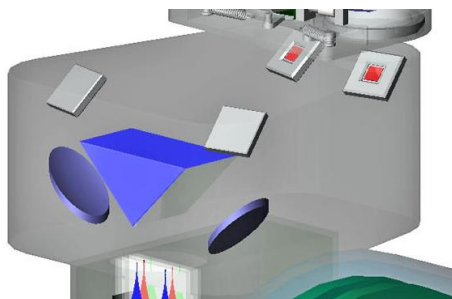
New AO Technology

Cryogenic 2-stage MEMS DM
NGS (science arm) &
Multi-LGS

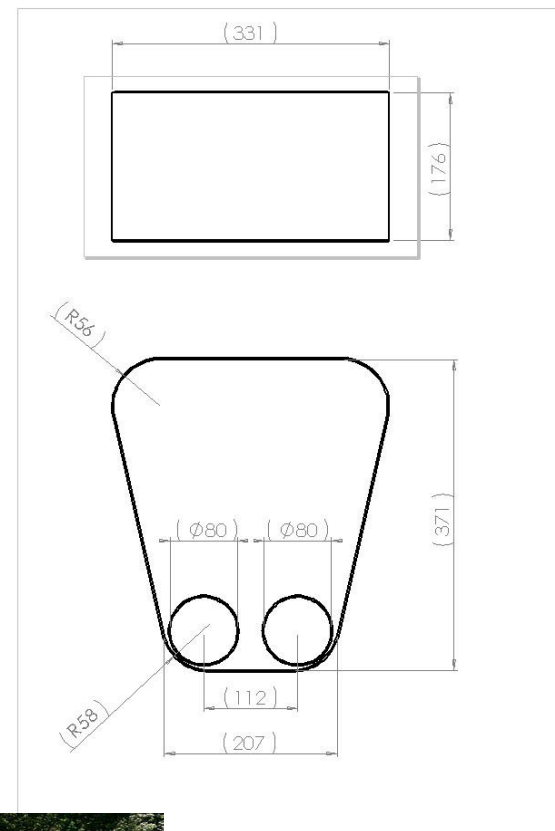
Modest PSF based on...

Open-Loop control &
(semi-)tomography

Robust, but, hopefully, inexpensive



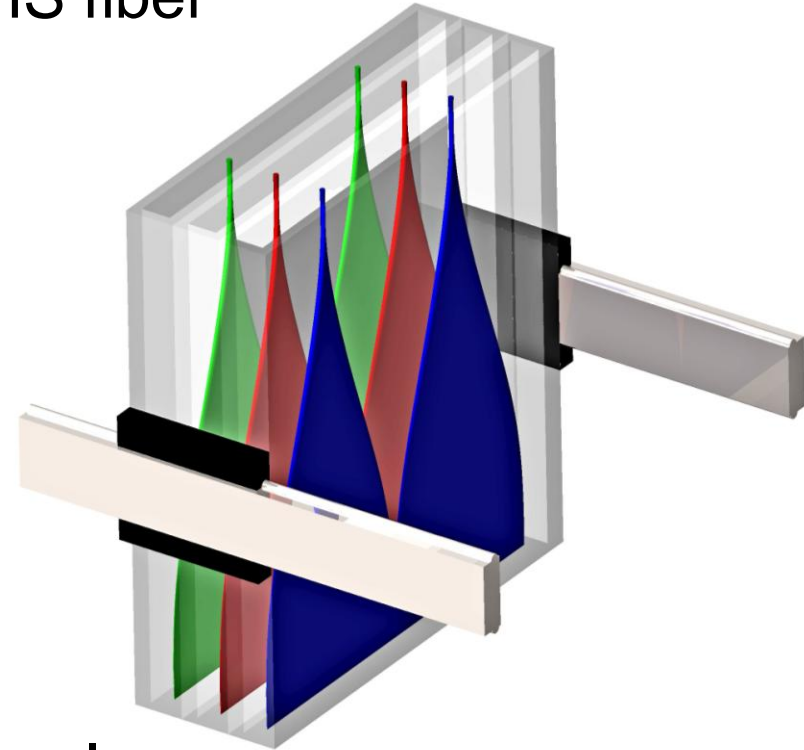
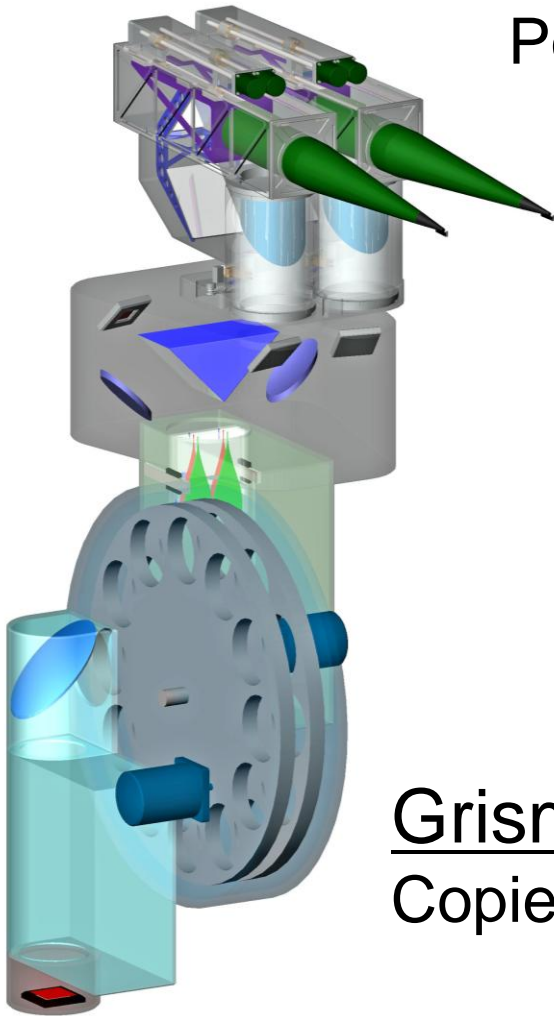
What is CIRMOS?



What is CIRMOS?

Fiber 2D to 1D Re-Formatter

Possible use of OHS fiber



Grism/Filters on wheel

Copied from MOIRCS

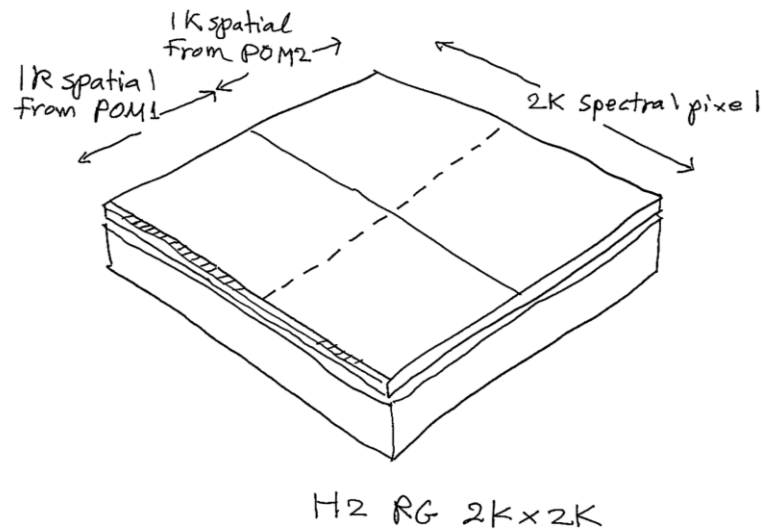
What is CIRMOS?

Science Detectors

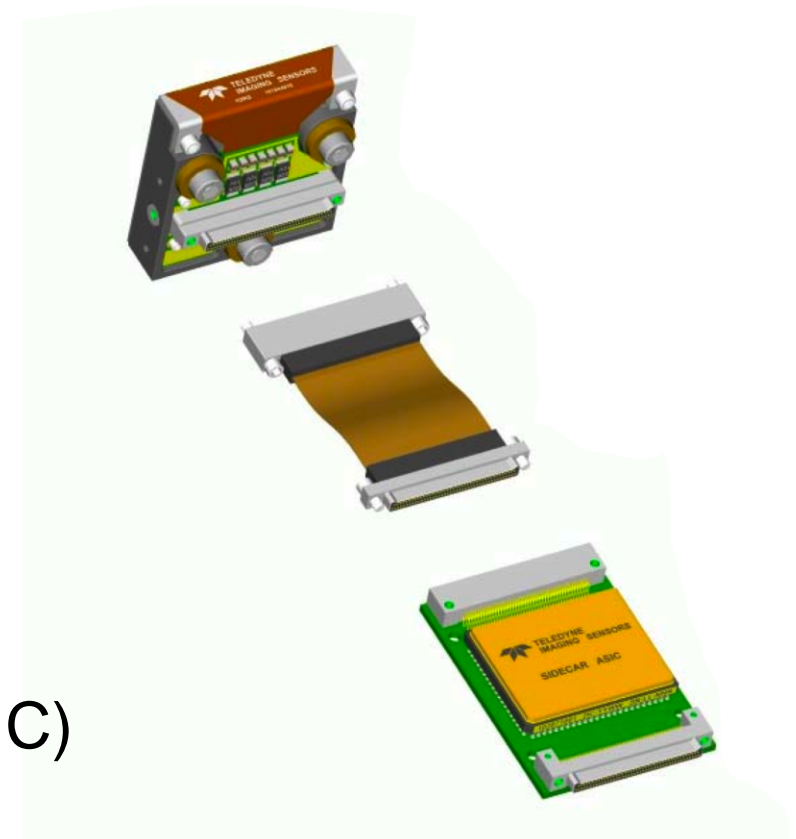
Prototype: 1 x (H2RG + ASIC)

Two x 1024 spatial elements

2048 spectral elements

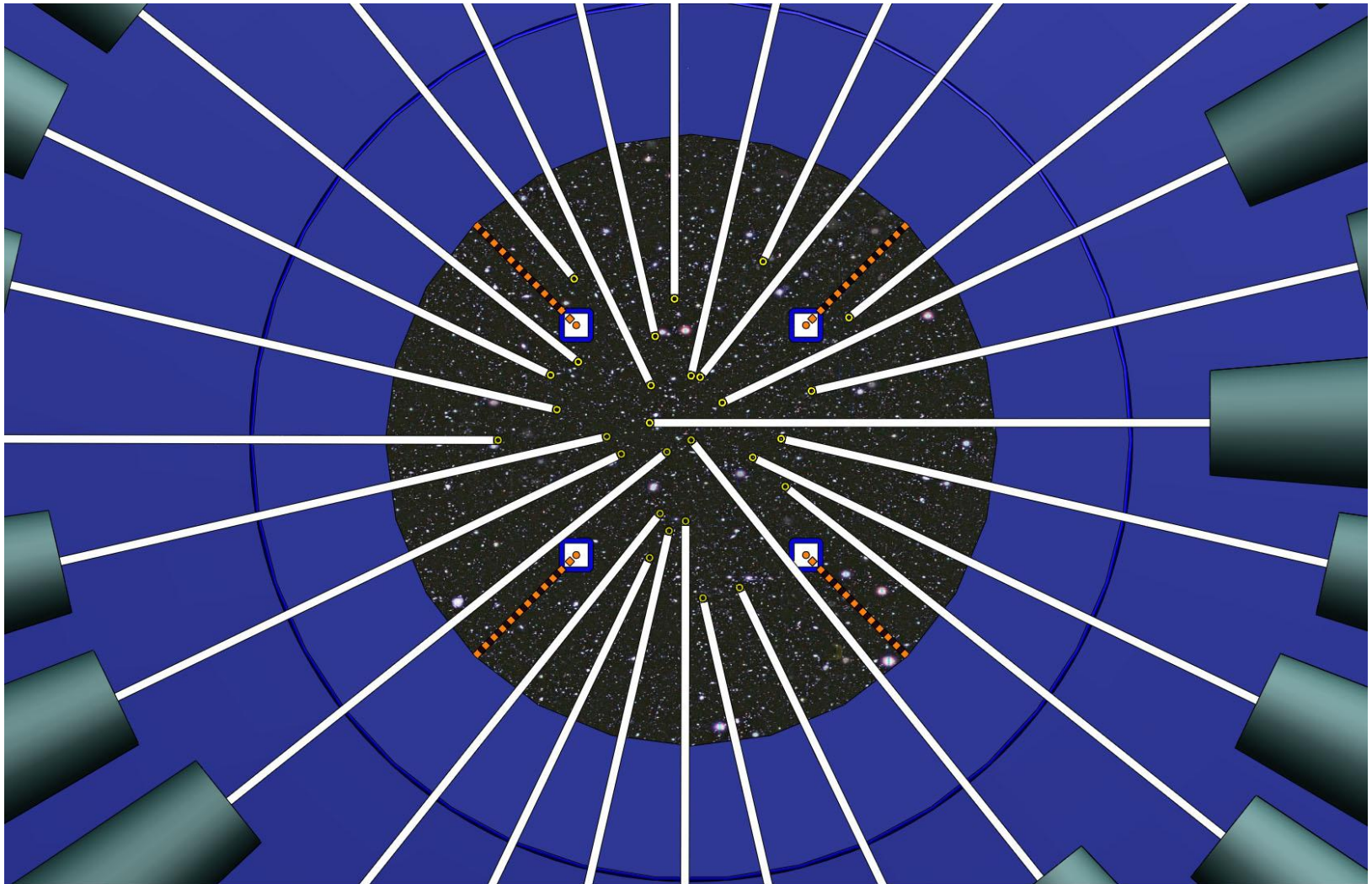


Ultimately 13 or 14 x (H2RG + ASIC)

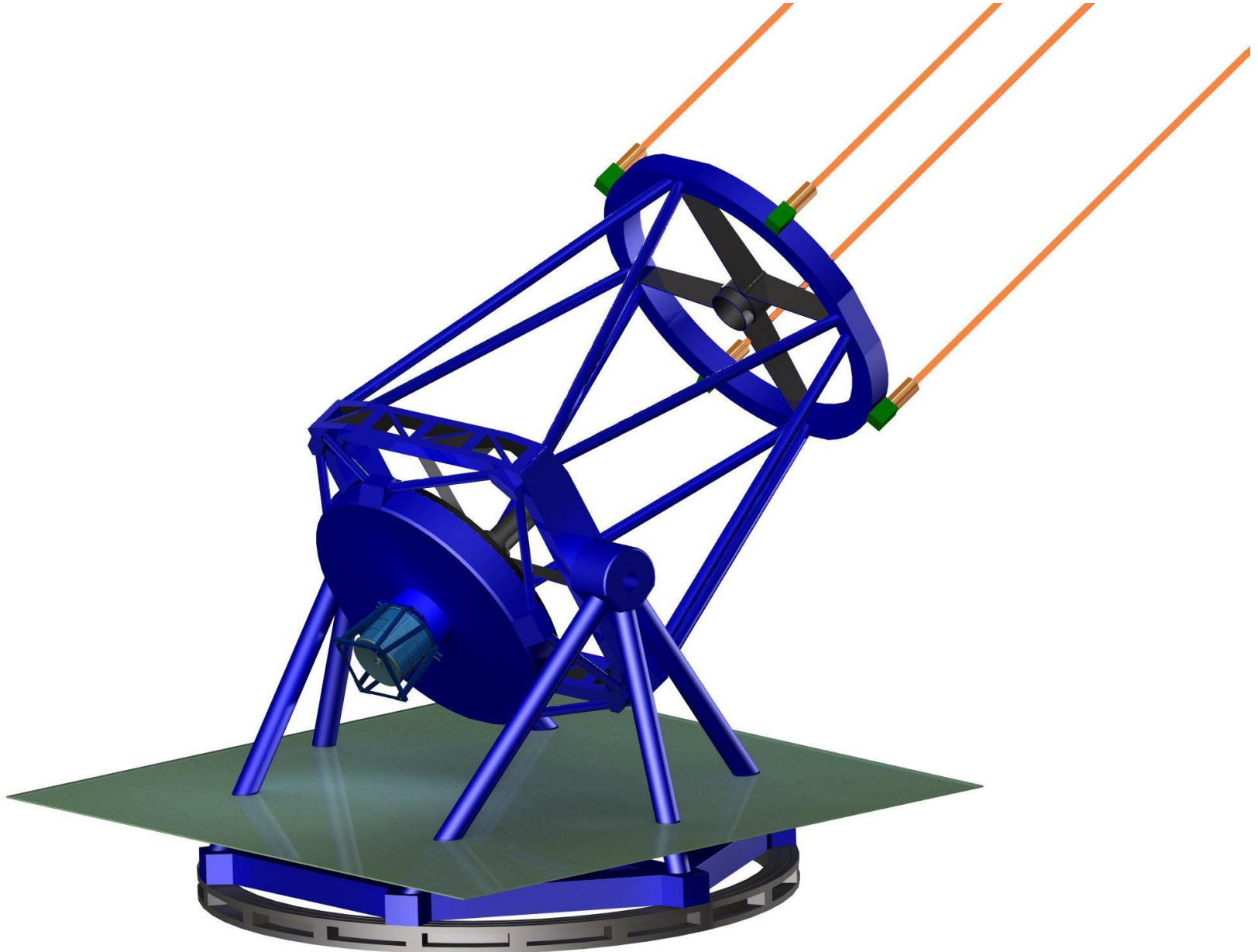


What is CIRMOS?

- Multi-Object Spectrograph with new AO



CIRMOS with AO



CIRMOS with AO

with AO



without AO



CIRMOS with AO

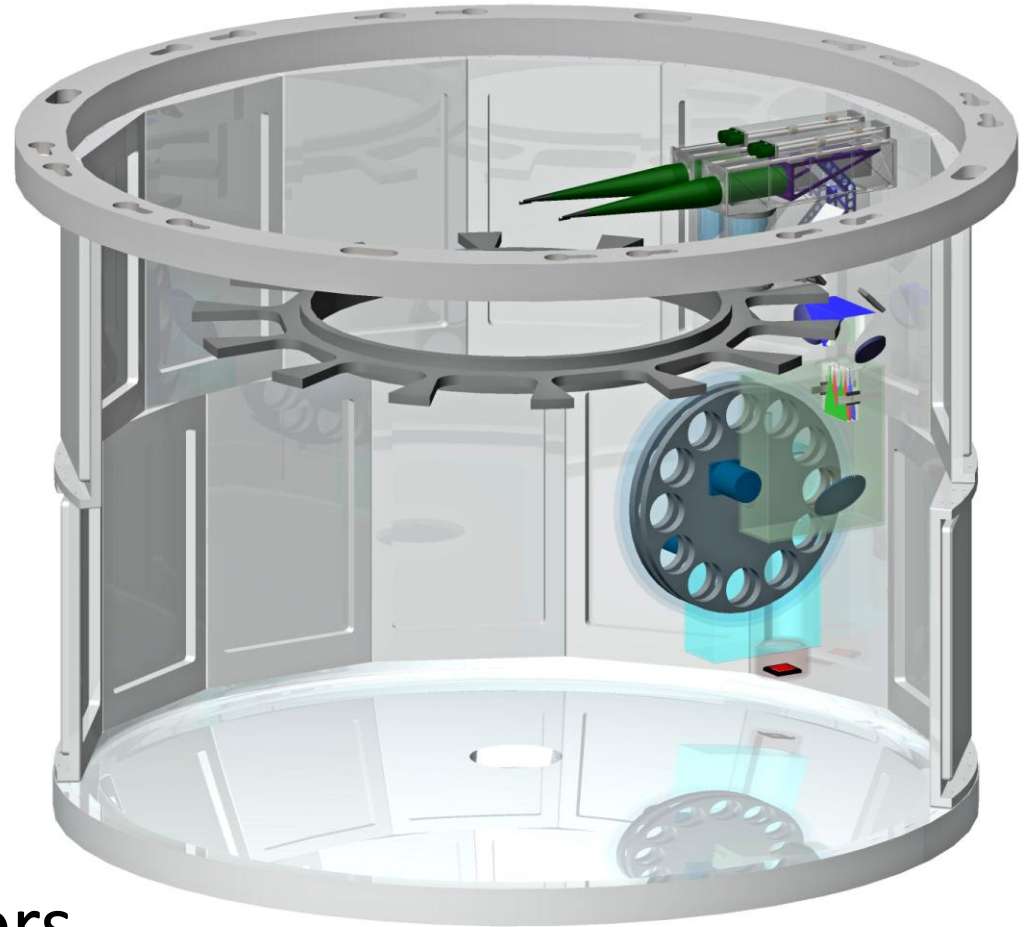


without AO

with AO

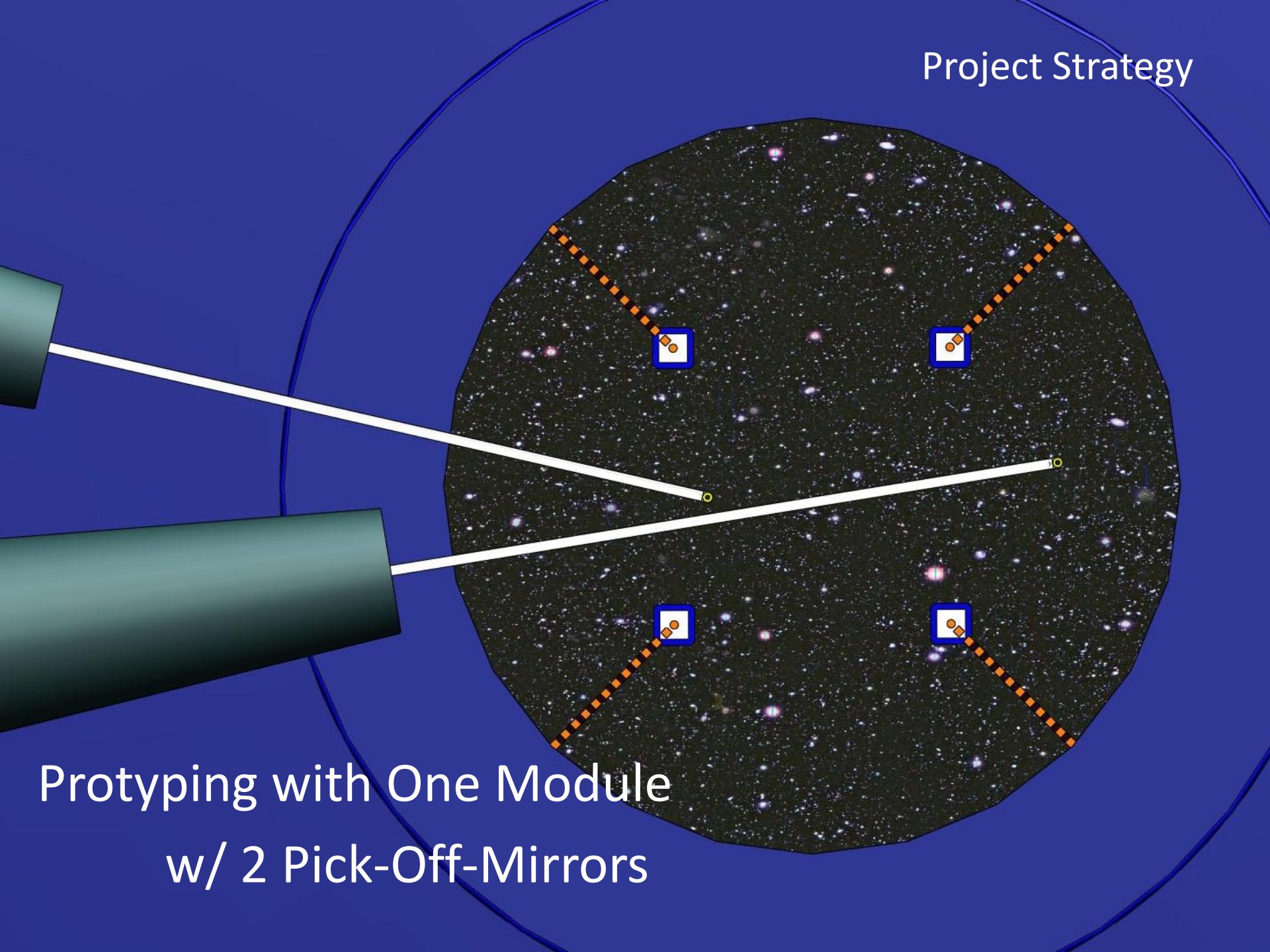


- From a single star at the center...
to wide field
... open loop with (semi-)tomography
- From closed loop servo that does not require
knowledge of atmosphere...
to real time atmospheric modeling
by (multiple) LGS probing



- Prototyping
 - w/ one module
 - w/ 2 pickoff mirrors
 - ... and a lot of AO experimentation
- Full utilization of ASIC technology

Project Strategy



Prototyping with One Module
w/ 2 Pick-Off-Mirrors

After 3-4 yeas of

... prototyping

... and AO experimentation

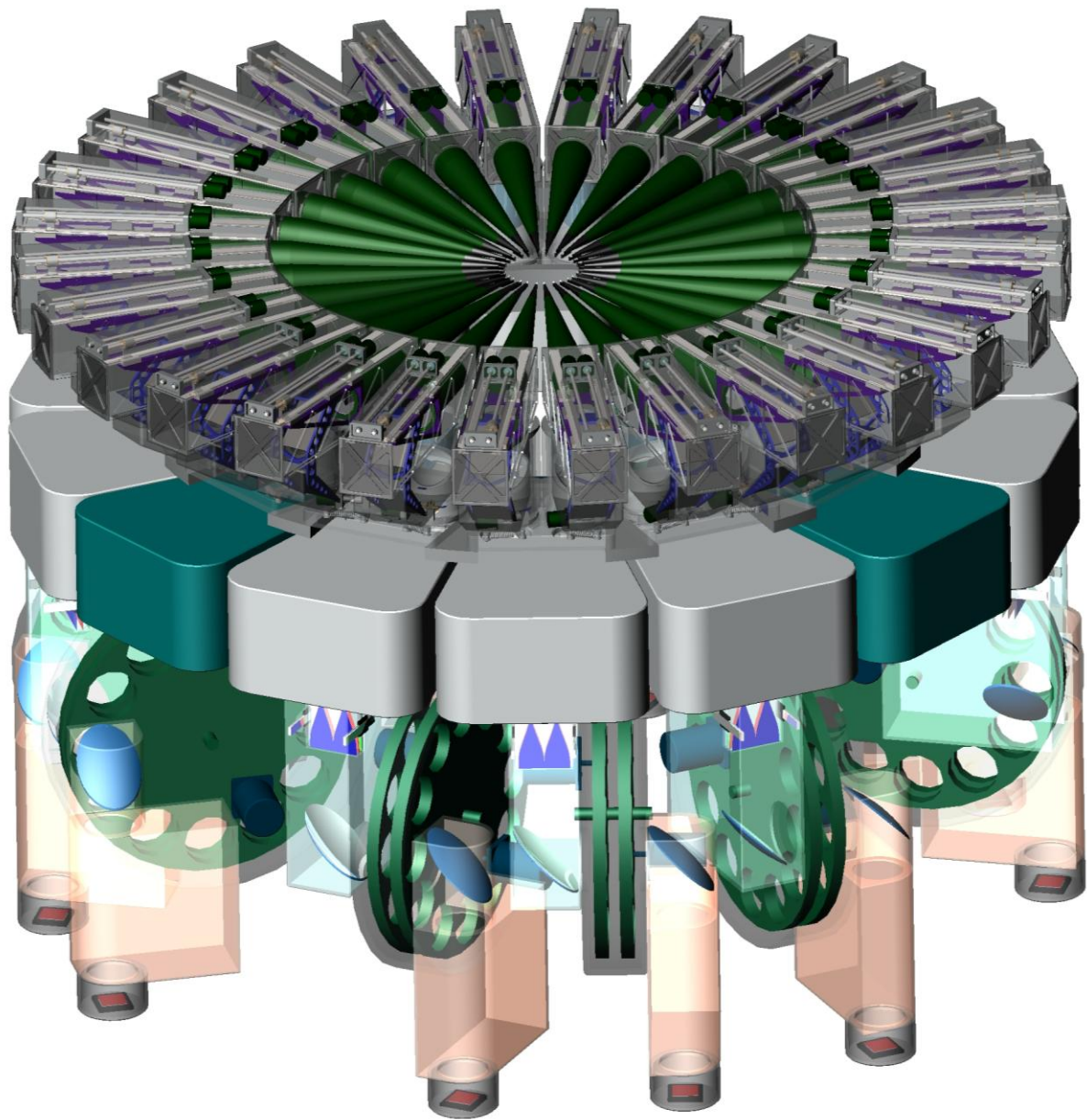
We will seek for approval

... in around 2015

... for a Full Version with multiplication

... of the modules from 1 to 14

... or 28 pick-off mirrors



- Timeline ...Pre-TMT Subaru (2010-2018)
- Who? ... with Subaru's leadership
 - Work packages incl. international collaborators
 - ...ASIAA, MPIfA, UA, U. Sydney (Bland-Hawthorn)?
 - Collaborators interested in testing their devices on CIRMOS “testbed”?
- Goals
 - Fast: Take advantages of ... MOIRCS, LGS,
 - Fast: Prototyping-as-it-goes approach
 - Offer on-telescope testbed with minimum impact by modular construction in standard Cs package

- Raven versus CIRMOS
 - Raven is a great path to TMT, but so is CIRMOS...
 - Does Raven serve Subaru pre-TMT era?
- CIRMOS modular construction is good for testing R&D devices,
 - ... such as WFS, algorithm, and/or DM
- Isn't the "testbed" attractive to other teams?

To conclude...

... If I am not too discouraged by the outcome of this meeting today...

tomorrow , I will make a trip...

... to ask some theoreticians

If DM astronomy deserves a new instrument

... if so, ask them to help define CIRMOS

... from scientific point of view

... and render support for CIRMOS

Full version after successful prototype



