Next Gen. SOFIA Instruments for Gal./X-Gal. Star Formation & Evolution

Wide FOV IR Imager - Polarimeter

- Tile entire 8' FOV

$\lambda \sim 5 \Rightarrow 30$ / $30 \Rightarrow 210$ μm

R ~ 10 - 10^4 fixed &/or tunable filters

Polarimeter modules: linear & circular

Multi-Object Spectro - Polarimeter

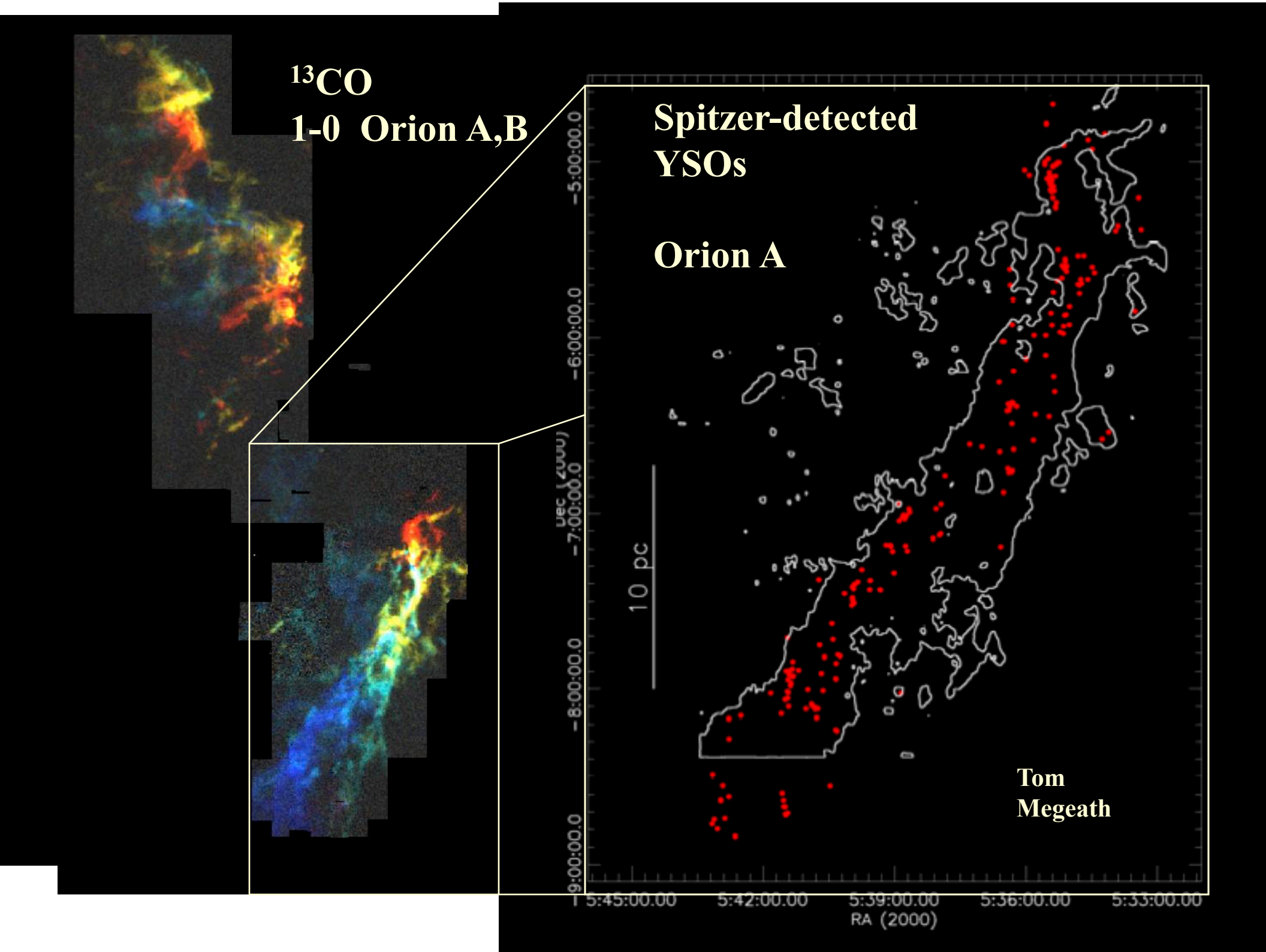
- Multiple, independently-targetable robotic feed

$\lambda \sim 5 \Rightarrow 30$ / $30 \Rightarrow 210$ μm

R ~ 10^2 - 10^4 cross-dispersed grating

R > 10^5 long-slit or cross-disp. grating or heterodyne

3 - 5 μm immersion Si/grating MOS

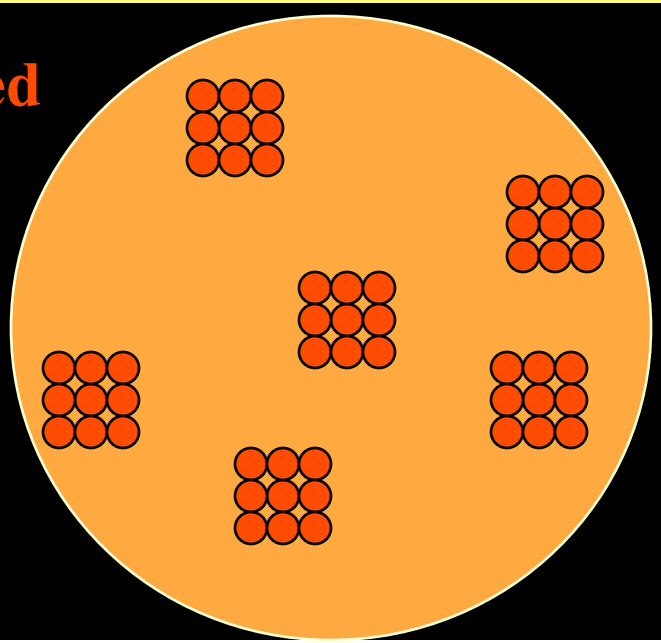

^{13}CO
1-0 Orion A,B
Spitzer-detected
YSOs
Orion A
10 pc
-5:00:00.0
-6:00:00.0
-7:00:00.0
-8:00:00.0
-9:00:00.0
5:45:00.00
5:42:00.00
5:39:00.00
5:36:00.00
5:33:00.00
RA (2000)
Tom
Megeath

Types of MOS

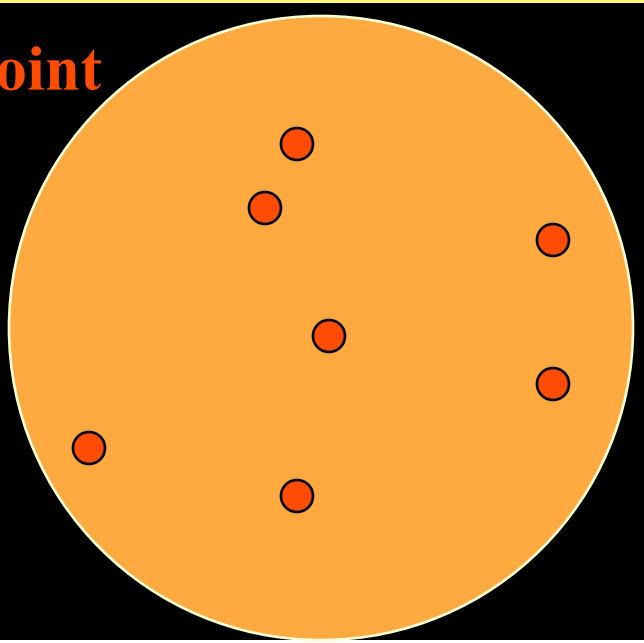
Sparse-field imaging vs. Multiple point sources

$R = \lambda/\Delta\lambda$	~ 5	10^3	10^6	Fore-optics
Point	MKIDs	Z-Spec cluster	heterodyne	trombone or fiber
Extended	MKID clusters	Z-Spec clusters	heterodyne cameras	folded Offner / fiber bundles

Extended

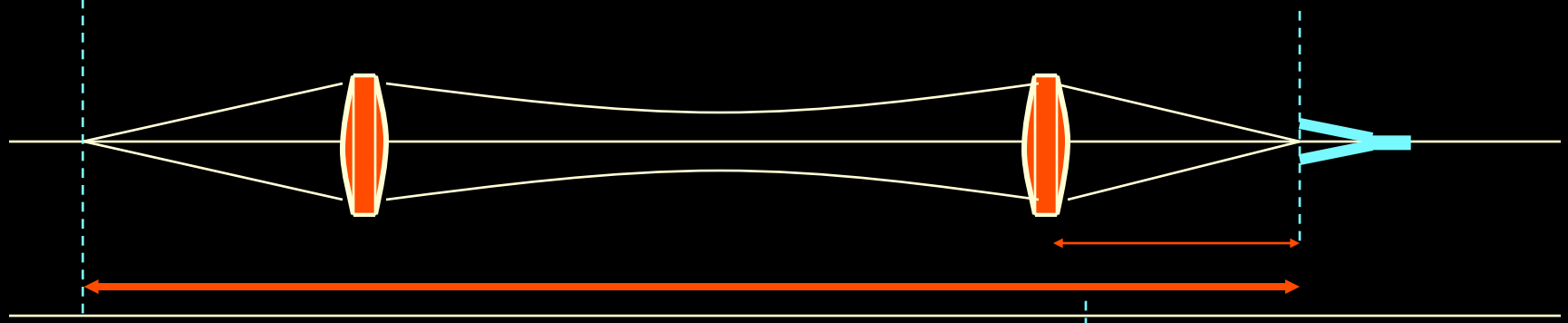


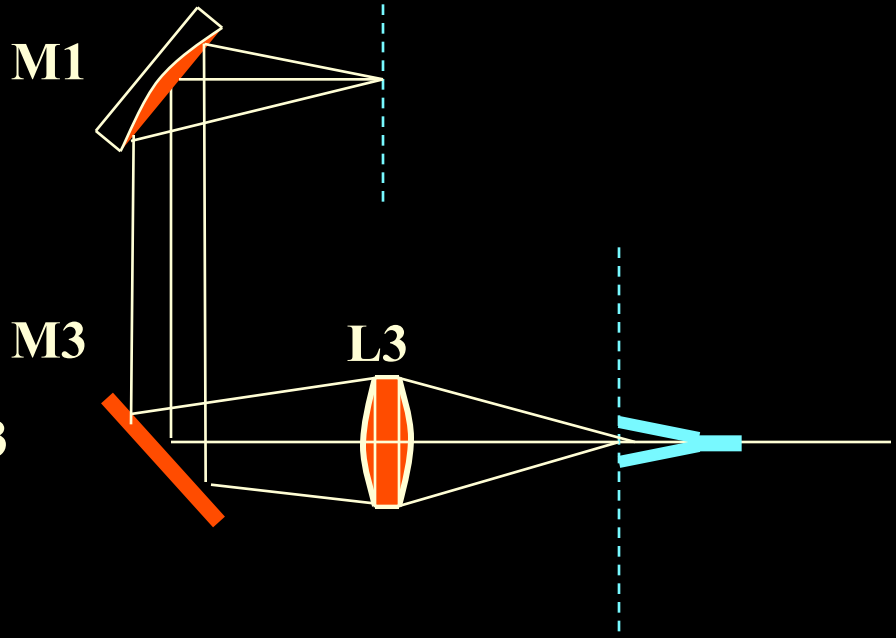
Point



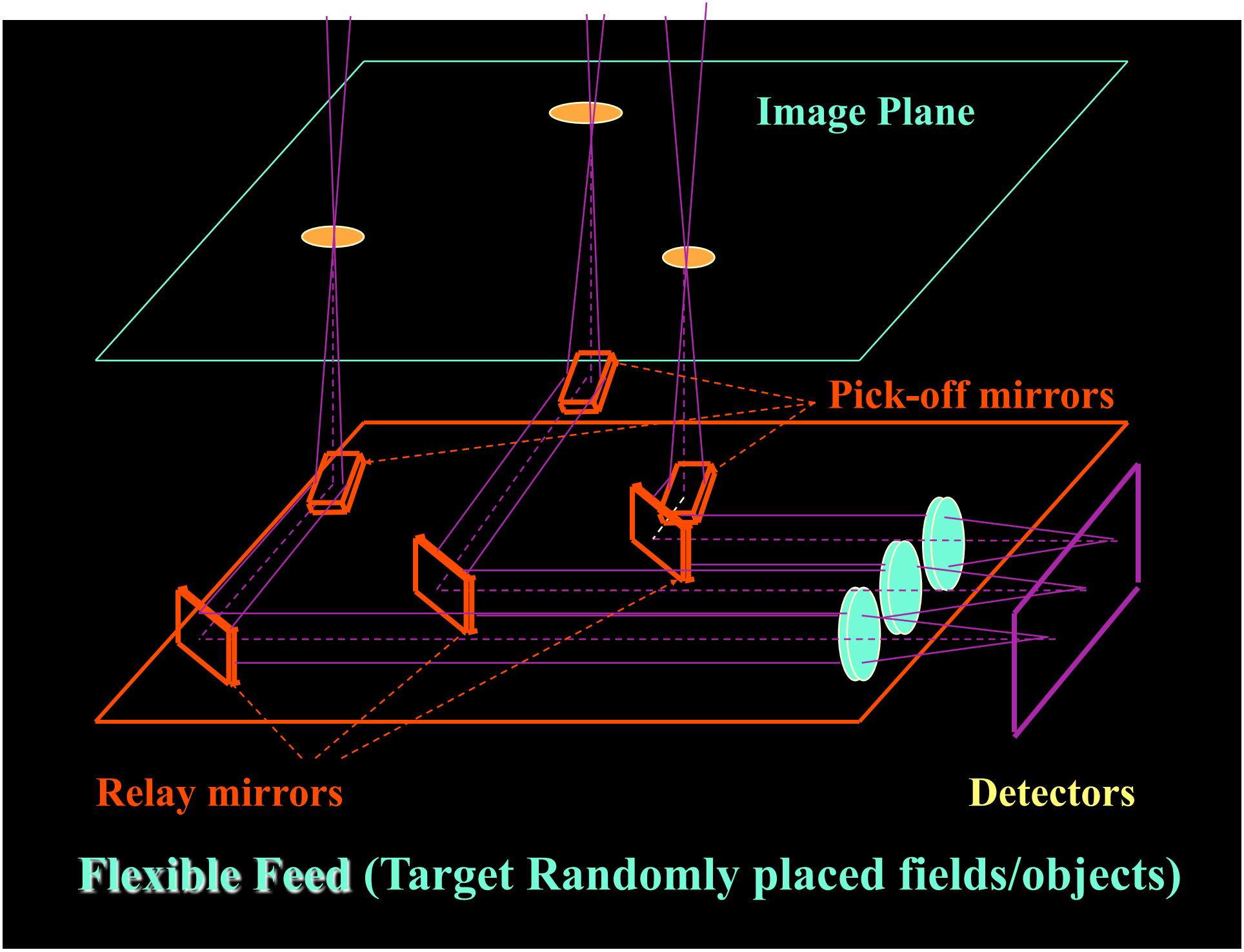
Gaussian Relays ("optical trombones")

Mirrors held by magnetic clamps
Re-configured by robot arm





M1 "Parallel "beam
+ Y - axis steering M3
M2 X-axis steering flat
L3 Compensating lens

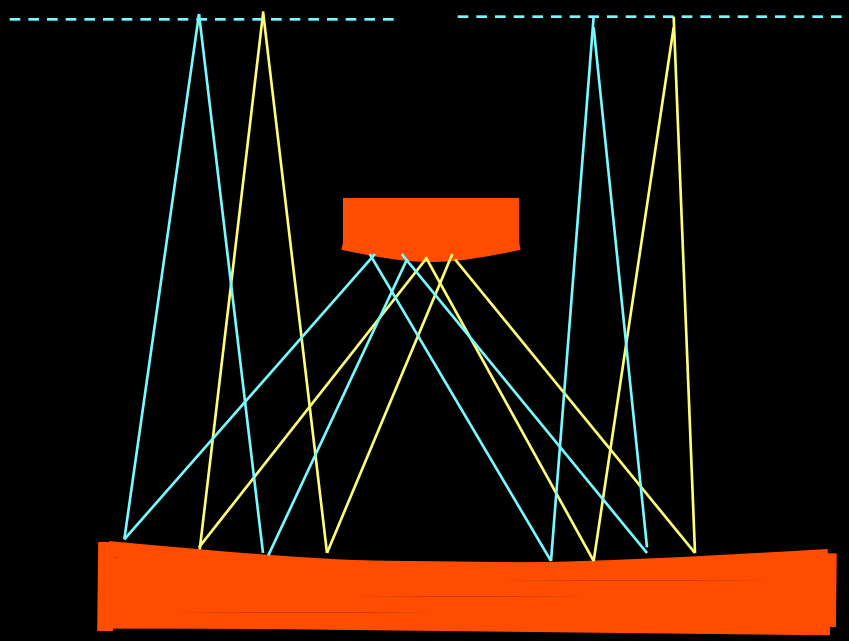


Flexible Feed (Target Randomly placed fields/objects)

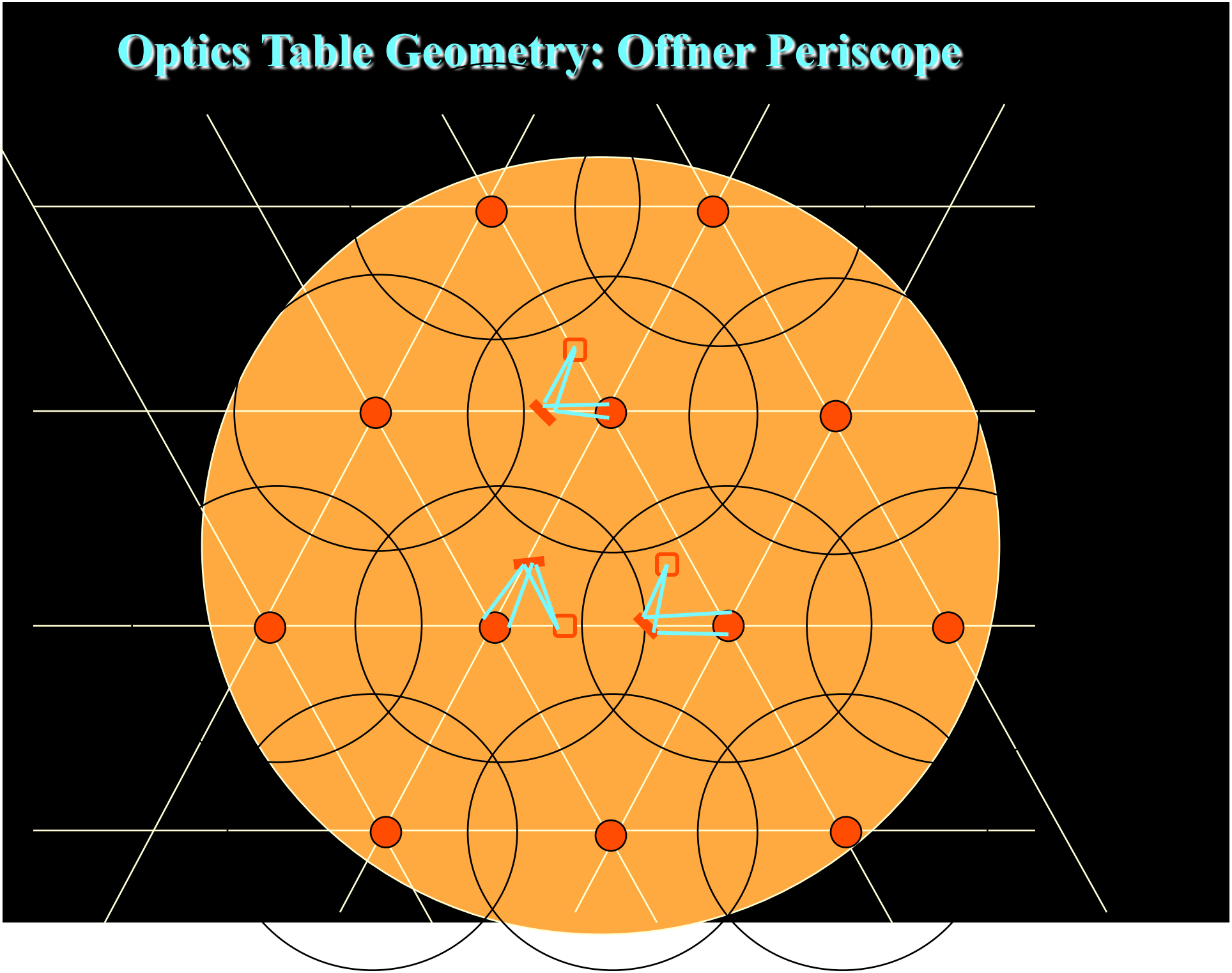
Optics Table Geometry: Offner Periscope

Offner Relay (e.g. Lithographic mask aligners)

- **1:1 image transfer with high fidelity**
- **All reflecting optics => low loss**
- **Wide, flat field**
- **Add flats to fold, and form periscope**



Optics Table Geometry: Offner Periscope



Conclusions

Next Gen. Instruments for Next Decade:

- Maximize use of SOFIA FOV

  - Tile focal plane for imaging & polarimetry

- Two Types of Flexible Feed Geometry:

  Reconfigure with magnetic clamps operated by robot arm
  => No linear actuators needed!

  - Flexible Dielectric Waveguide (Jason Glenn)
    NIR 3 - 5 μm

  - Gaussian Optical Trombone
    thermal-IR