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Seen from Subaru’s cat walk; photo by S. Hayashi

POL-2 stands unique!

A Comparison of Current Status of Single-Dish Polarimetry

Telescope	Polarimetry camera	Center Wavelength [μm]	$\theta_{\rm HPBW}$ [arcsec]	N. of pixels	Mapping Speed [arcmin^2 hr^{-1}]	NEP [W^2 s$^{1/2}$]	Status
JCMT 15m	**POL-2**	**450** **850**	**8** **14**	**5120** **5120**	**~50**	**<5e-16**	**Science Operations**
JCMT 15m	POL-3	850	14	3636	~1000	<4e-17	Planned
IRAM 30m	NIKA-2	1150	11	950	~1000	1.5[mK s$^{1/2}$]	Commissioning
LMT 50m	TolTEC	1100	6	3600	~7000	9.5e-17	Commissioning?

THE ROLE OF MAGNETIC FIELDS IN THE FORMATION OF STARS

EDITED BY: Derek Ward-Thompson, Ray S. Furuya, Yusuke Tsukamoto and Christopher F. McKee
PUBLISHED IN: Frontiers in Astronomy and Space Sciences

frontiers Research Topics

Table of Conter

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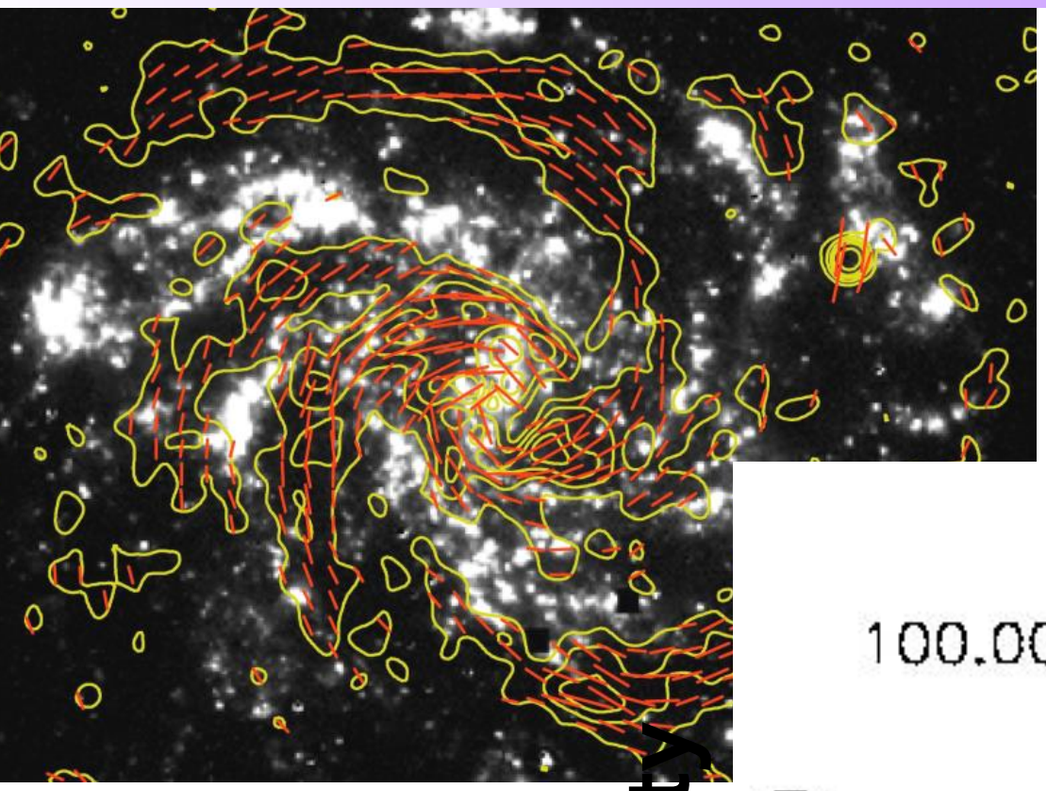
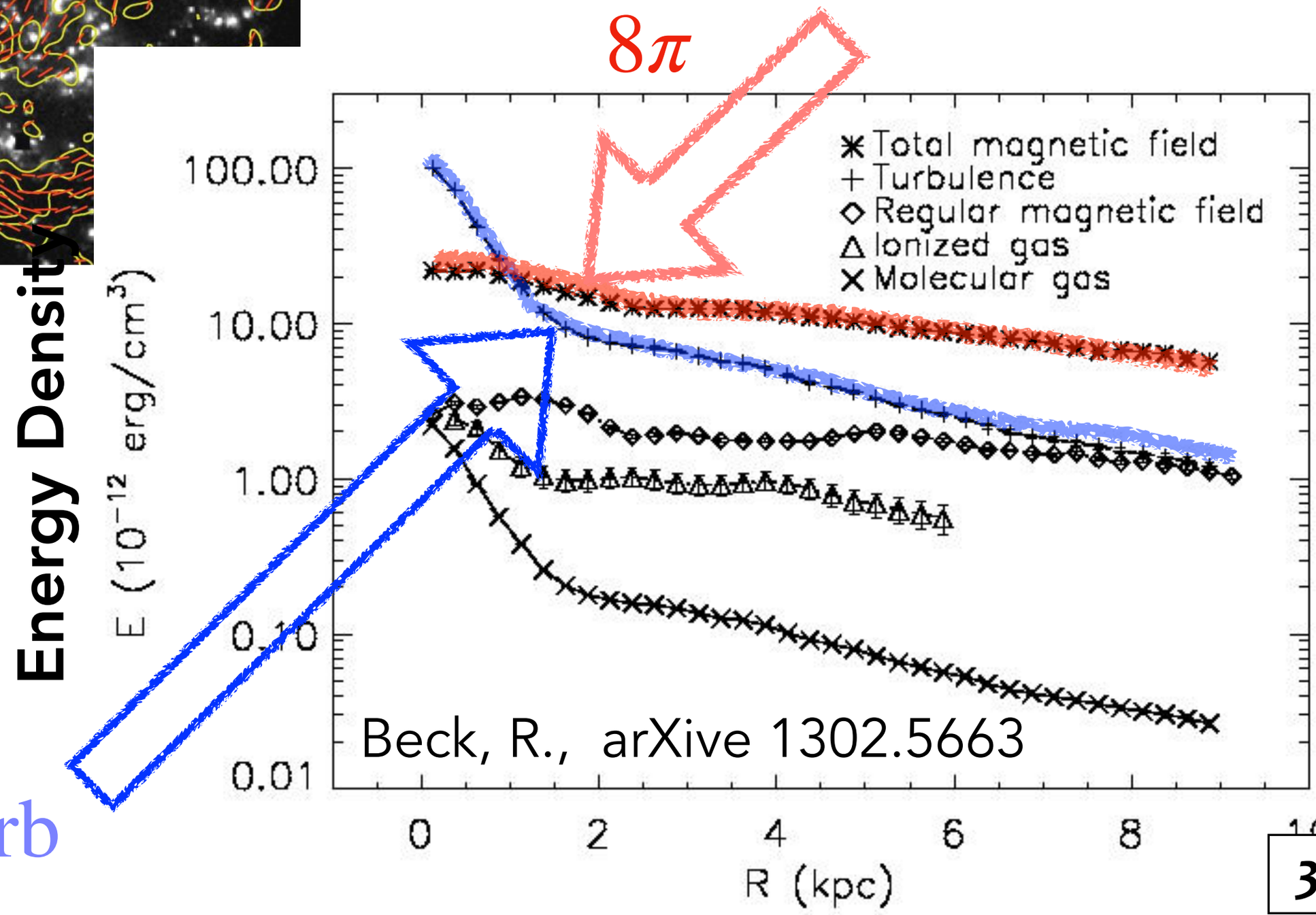
Ray S. Furuya (Tokushima U.)

銀河円盤のガスを支配するのは，磁場と乱流



Radial energy balance of a galactic disk

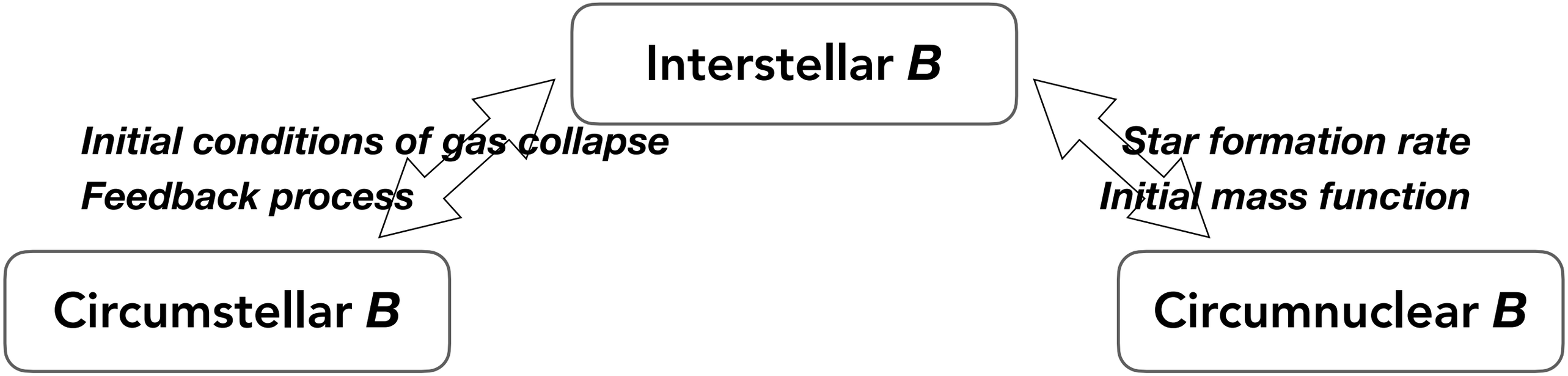
$$\frac{|\vec{B}|^2}{8\pi}$$



$$\frac{1}{2}\rho v_{\mathrm{turb}}^2$$

B-field study with POL-2: questions to be addressed

Primordial?, astrophysical process? or both?



Primordial ***Primordial***

Theory predicts that *B* fields are *passive in dynamics*; however, *B* fields play *significant* roles in *some* conditions.

At what *evolutionary stage*, over what *spatial scale*, or/and over what *density range* does *B* field play a key role?

Does α dynamo really maintain galaxy-scale *B* field?

e.g., Brandenburg & Furuya 2020, MNRAS 496, 4749

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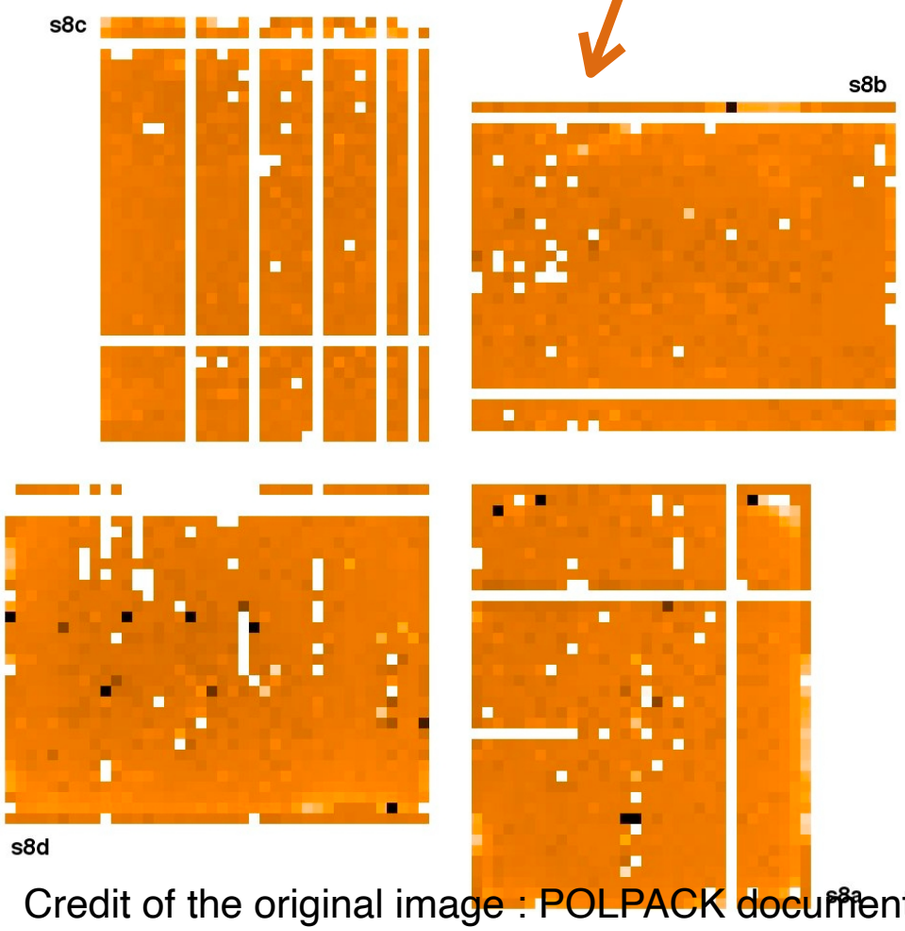
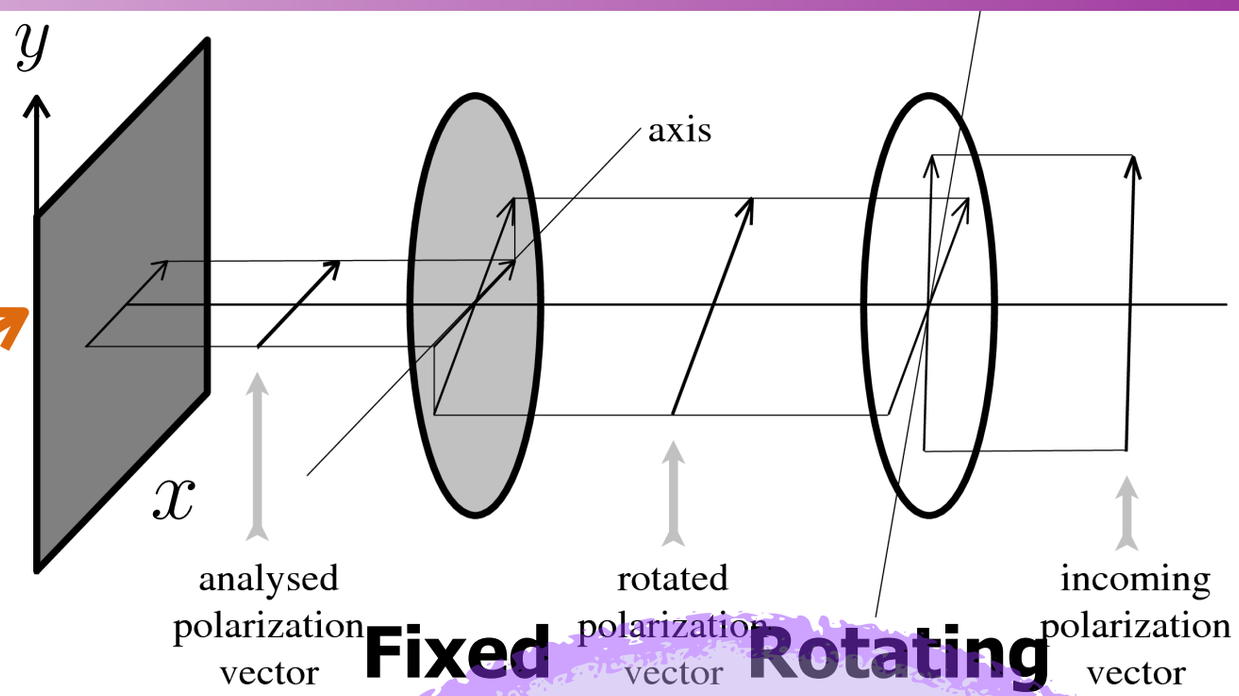
Toward Future Projects: *Beyond JCMT*

SCUBA-2
focal plane
(current system)





Fixed Analyzer (Wire grids)

Rotating Halfwave Plate

MKID
focal plane
(new camera)

Credit of the original image : POLPACK documentation/SUN 233

MAGNETIC FIELDS STUDIES IN THE NEXT DECADE

EAO SUBMILLIMETRE FUTURES PAPER SERIES, 2019

Ray S. Furuya[*1] • **Kate Pattle**[2] • **Simon Coudé**[3] • **Tao-Chung Ching**[4] • **Steve Mairs**[5]
Sarah Sadavoy[6,7] • **Peter Scicluna**[8] • **Archana Soam**[3] • **Chakali Eswaraiah**[4] • **Samar Safi-Harb**[9]

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ABSTRACT

Magnetic fields are ubiquitous in our Universe, but remain poorly understood in many branches of astrophysics. A key tool for inferring astrophysical magnetic field properties is dust emission polarimetry. The James Clerk Maxwell Telescope (JCMT) is planning a new 850 μm camera consisting of an array of 7272 paired Microwave Kinetic Inductance Detectors (MKIDs), which will inherently acquire linear polarization information. The camera will allow wide-area polarization mapping of dust emission at 14$''$-resolution, allowing magnetic field properties to be studied in a wide range of environments, including all stages of the star formation process, Asymptotic Giant Branch stellar envelopes and planetary nebula, external galaxies including starburst galaxies and analogues for the Milky Way, and the environments of active galactic nuclei (AGN). Time domain studies of AGN and protostellar polarization variability will also become practicable. Studies of the polarization properties of the interstellar medium will also allow detailed investigation of dust grain properties and physics. These investigations would benefit from a potential future upgrade adding 450 μm capability to the camera, which would allow inference of spectral indices for polarized dust emission in a range of environments. The enhanced mapping speed and polarization capabilities of

LST

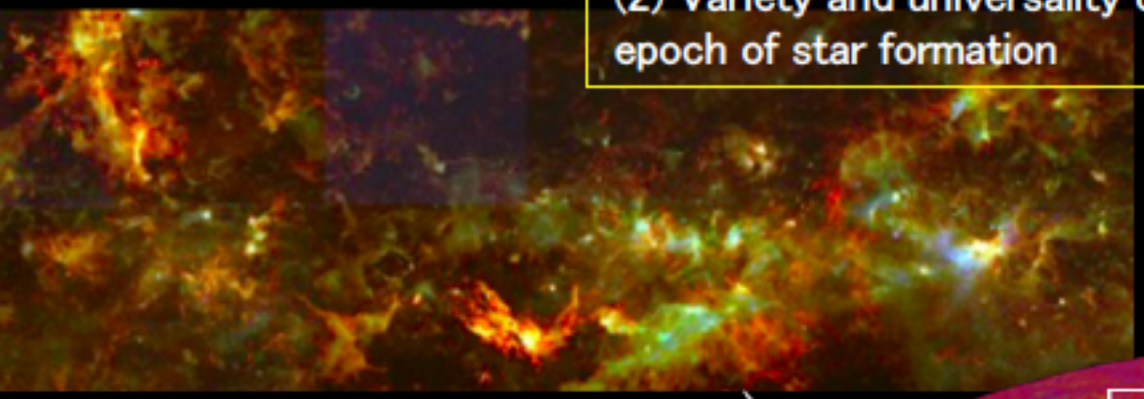
LARGE SUBMILLIMETER TELESCOPE

www.lstobservatory.org

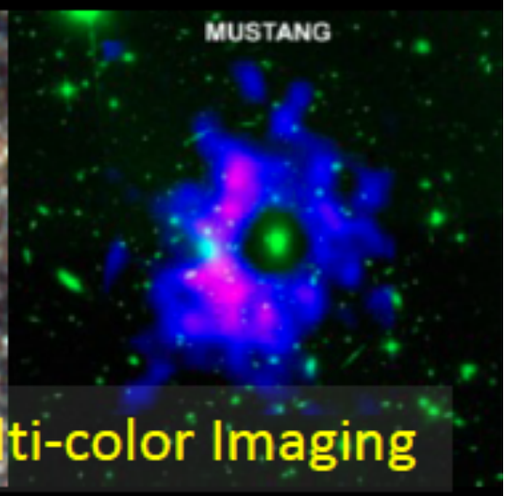
2 major key science goals:

(1) Formation and evolution of galaxies in the cosmic history from the present-day to the epoch of reionization

(2) Variety and universality of the early epoch of star formation



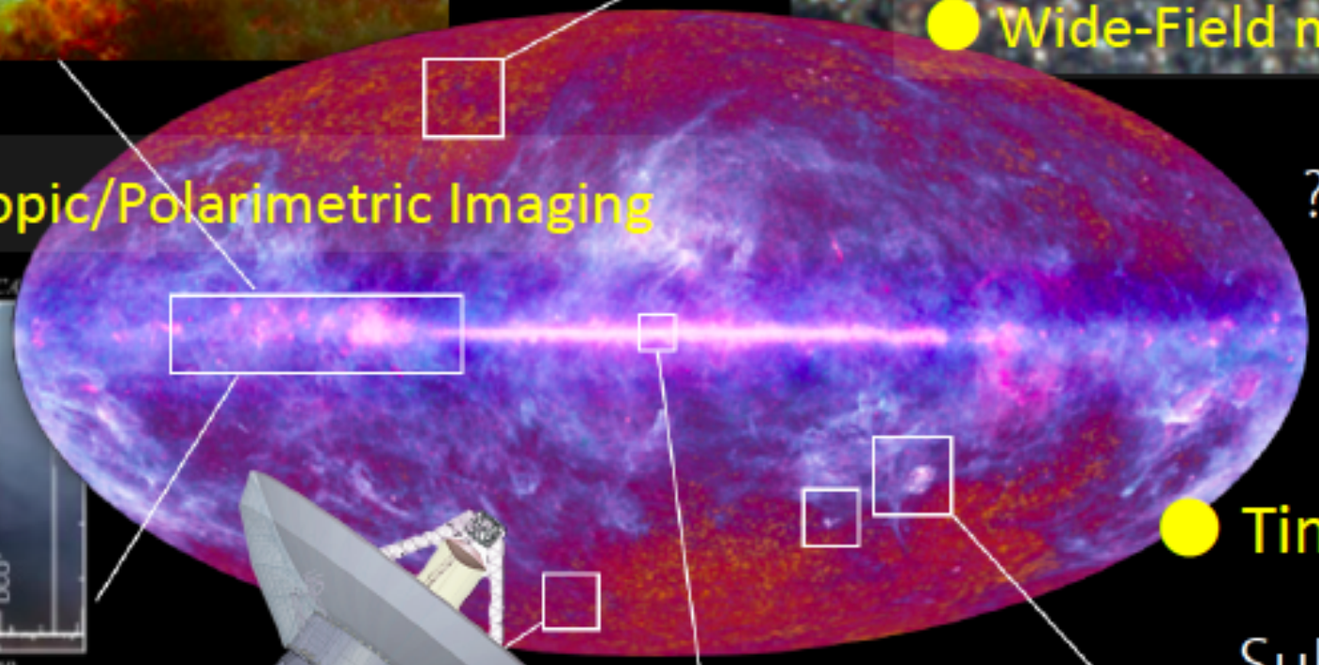
Distant Galaxies and Clusters

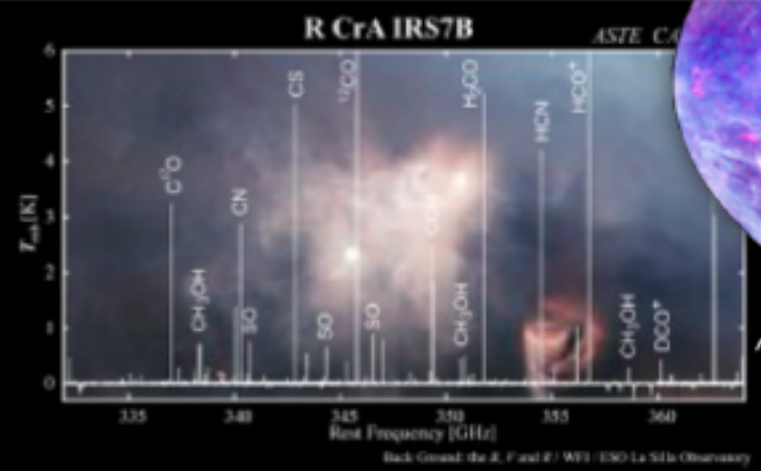


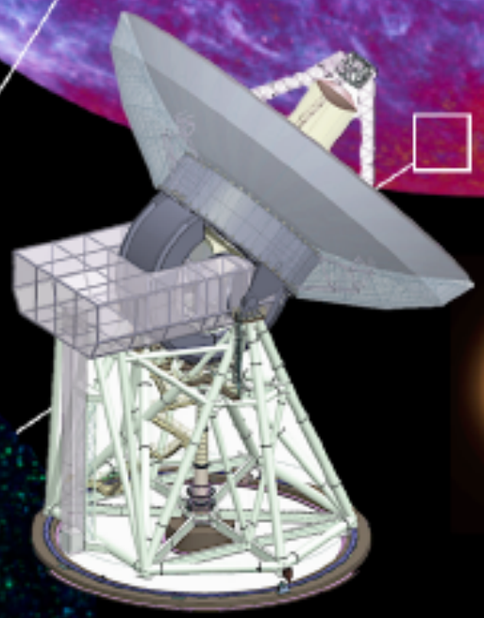
● Wide-Field multi-color Imaging

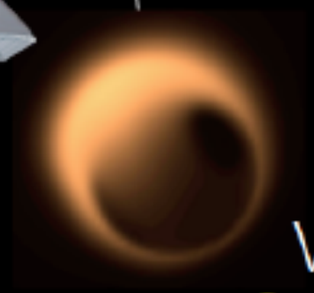
Galactic Plane

● Wide-Field Spectroscopic/Polarimetric Imaging





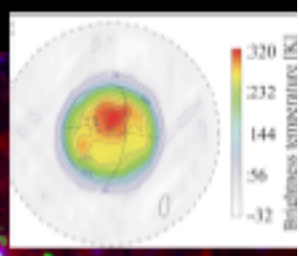




● Time-domain Science

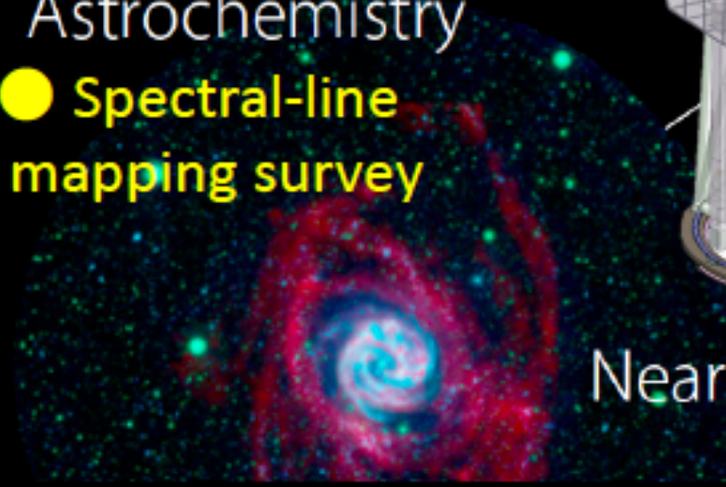
Submm Transients

Planetary atmospheres



Astrochemistry

● Spectral-line mapping survey



VLBI

● high cadence submm VLBI

Nearby Galaxies

Magellanic Clouds

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Seen from Subaru’s cat walk; photo by S. Hayashi

Ray S. Furuya (Tokushima U.)

日本もアジア諸国とともにEAOを創る意義

特集：東アジア天文台

［1］東アジア天文台の発足と将来展望

林　　正　彦

〈国立天文台台長〉

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今後の天文学分野における国際協力において，日本はTMTの例のように，その都度協力する相手を探して組んでいけば良いのであろうか？　それもありえるだろう．しかし，その都度協力相手を見つける方法には，いささか不安を感じる．第一に，そのやり方で日本のコミュニティーの意向に沿う形でプロジェクトをリードできるかどうか．例えば欧州と組もうとすると，相手としては必然的にESOを想定することになる．その場合，日本一国ではたぶんマイナーパートナーとなるだろう．第二に，その都度協力相手を見つけるやり方だと，国際レベルの大型計画に関して，長期的プランニングを行うことは困難となるのではないかと感じる．

すぐに行き来できる地域内で，国際レベルの大型計画を実現できる経済力をもった常置の国際協力関係を築いておく必要があろう．それが東アジア天文台である．すでに着実な協同観測ネット

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地上遠赤外線偏波観測と東アジア天文台：現状と将来

Ray S. Furuya (Tokushima U.)