

Japanese plans w.r.t. international collaboration (IC)

Masashi Hazumi

(KEK/Kavli IPMU/SOKENDAI/ISAS JAXA)

Remark

“Progress with LiteBIRD” explained
yesterday. I won’t repeat.

This talk is on IC for LiteBIRD and
beyond.

Outline

1. IC for LiteBIRD up to now
2. LiteBIRD Phase-A1 goals on IC
3. Future perspective on IC

1. IC for LiteBIRD up to now

- Main international partnership between Japan and US
 - ISAS/JAXA working group (WG) → Phase-A1
 - NASA MO Phase A
- More collaborators in WG
 - McGill (Canada) for warm readout electronics
 - European participants
- External collaborators (EC) in the Joint Study Groups (JSG)
- Generic cooperative studies
 - e.g. AR coating R&D w/ U. Minnesota (Shaul Hanany's group)
- Job openings for enhancing IC

JAXA

T. Dotani
H. Fuke
H. Imada
I. Kawano
H. Matsuhara
T. Matsumura
K. Mitsuda
T. Nishibori
K. Nishijo
A. Noda
A. Okamoto
S. Sakai
Y. Sato
K. Shinozaki
H. Sugita
Y. Takei
S. Utsunomiya
T. Wada
R. Yamamoto
N. Yamasaki
T. Yoshida
K. Yotsumoto

Osaka U.

S. Kuromiya
M. Nakajima
S. Takakura
K. Takano

Kavli IPMU

K. Hattori
N. Katayama
Y. Sakurai
H. Sugai

Osaka Pref. U.

M. Inoue
K. Kimura
H. Ogawa
N. Okada

Okayama U.

T. Funaki
N. Hidehira
H. Ishino
A. Kabayashi
Y. Kida
K. Komatsu
S. Uozumi
Y. Yamada

NIFS

S. Takada

Kansei

Gakuin U.

S. Matsuura

Kitazato U.

T. Kawasaki

KEK

M. Hazumi (PI)
M. Hasegawa
N. Kimura
K. Kohri
M. Maki
Y. Minami
T. Nagasaki
R. Nagata
H. Nishino
S. Oguri
T. Okamura
N. Sato
J. Suzuki
T. Suzuki
O. Tajima
T. Tomaru
M. Yoshida

U. Tsukuba

TIT

M. Nagai
S. Matsuoka
R. Chendra

Konan U.

I. Ohta

NAOJ

A. Dominjon
T. Hasebe
J. Inatani
K. Karatsu
S. Kashima
T. Noguchi
Y. Sekimoto
M. Sekine

Saitama U.

M. Naruse

NICT

Y. Uzawa

SOKENDAI

Y. Akiba
Y. Inoue
H. Ishitsuka
Y. Segawa
S. Takatori
D. Tanabe
H. Watanabe

U. Tokyo

U. Tohoku

S. Sekiguchi
T. Shimizu
S. Shu
N. Tomita

Tohoku U.

M. Hattori

Nagoya U.

K. Ichiki

Yokohama

Natl. U.

T. Fujino
F. Irie
H. Kanai
S. Nakamura
T. Yamashita

RIKEN

S. Mima
C. Otani

APC Paris

R. Stompor

Cardiff U.

G. Pisano

Paris ILP

J. Errard

CU Boulder

N. Halverson

McGill U.

M. Dobbs

MPA

E. Komatsu

NIST

G. Hilton
J. Hubmayr

Stanford U.

S. Cho
K. Irwin
S. Kernasovskiy
C.-L. Kuo
D. Li
T. Namikawa
W. Ogburn

U. Wisconsin

K. Arnold

UC Berkeley / LBNL

D. Barron
J. Borrill
Y. Chinone
A. Cukierman
T. de Haan
N. Goeckner-wald
P. Harvey
C. Hill
W. Holzapfel
Y. Hori
O. Jeong
R. Keskitalo
T. Kisner
A. Kusaka
A. Lee(US PI)
E. Linder
P. Richards
U. Seljak
B. Sherwin
A. Suzuki
P. Turin
B. Westbrook
N. Whitehorn

UC San Diego

T. Elleot
B. Keating
G. Rebeiz

LiteBIRD working group

X-ray
astrophysicists

JAXA engineers

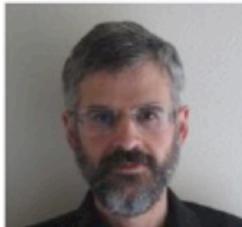
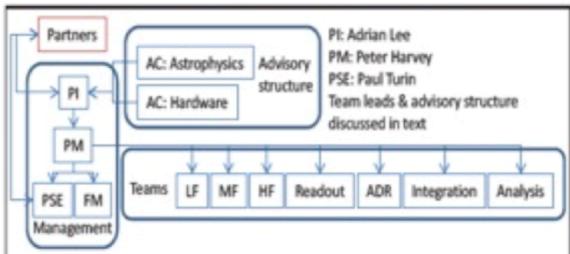
CMB
experimenters



Super-conducting
detector developers

IR astronomers

NASA MO Team Leads



[CU Boulder](#)
N. Halverson

[NIST](#)
G. Hilton
J. Hubmayr

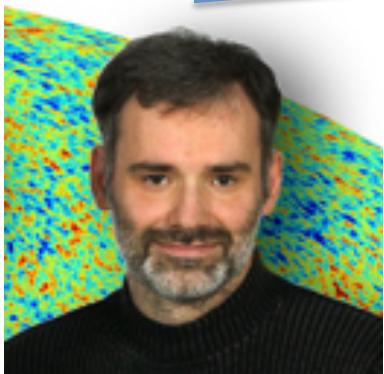
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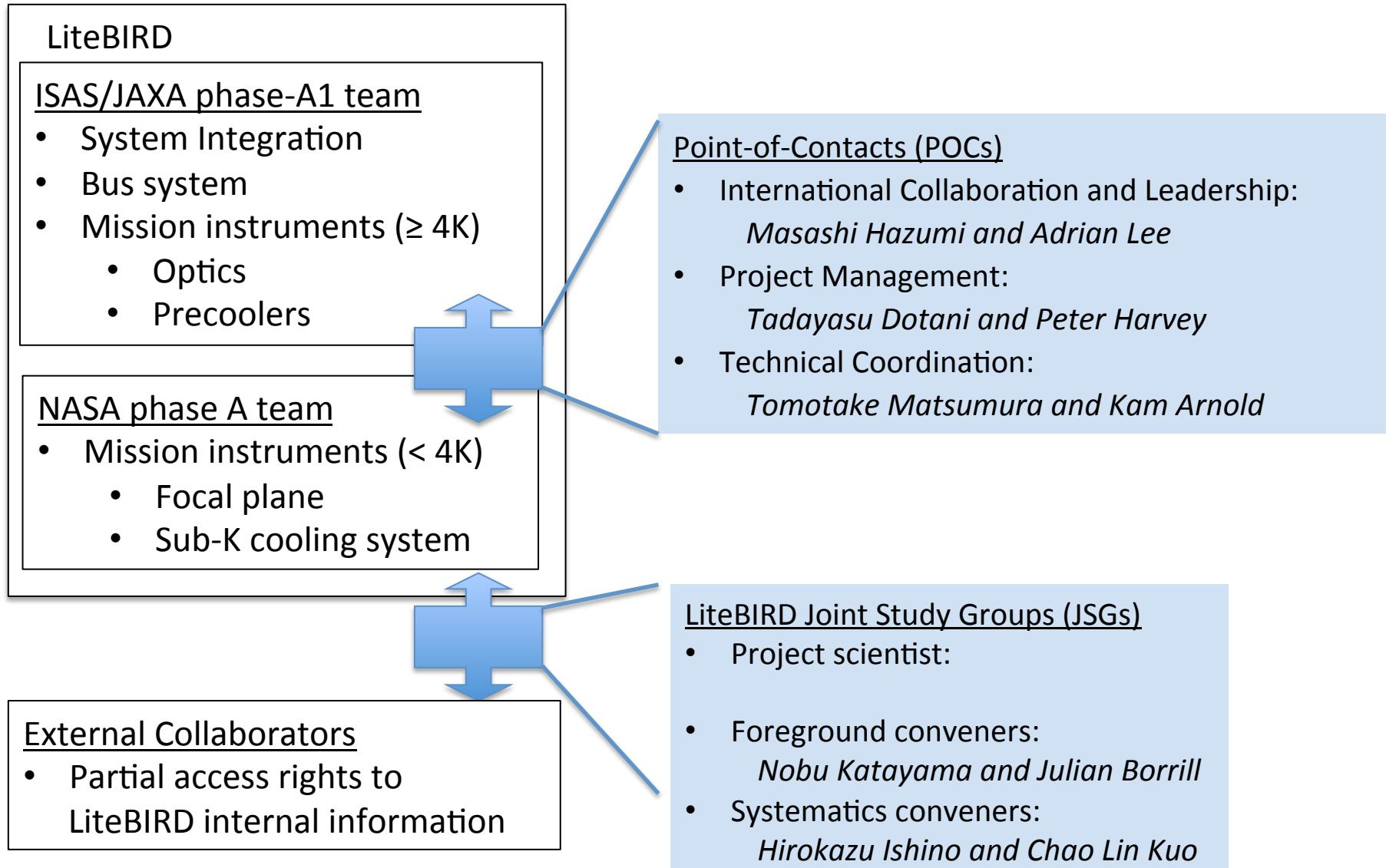


McGill U.
M. Dobbs

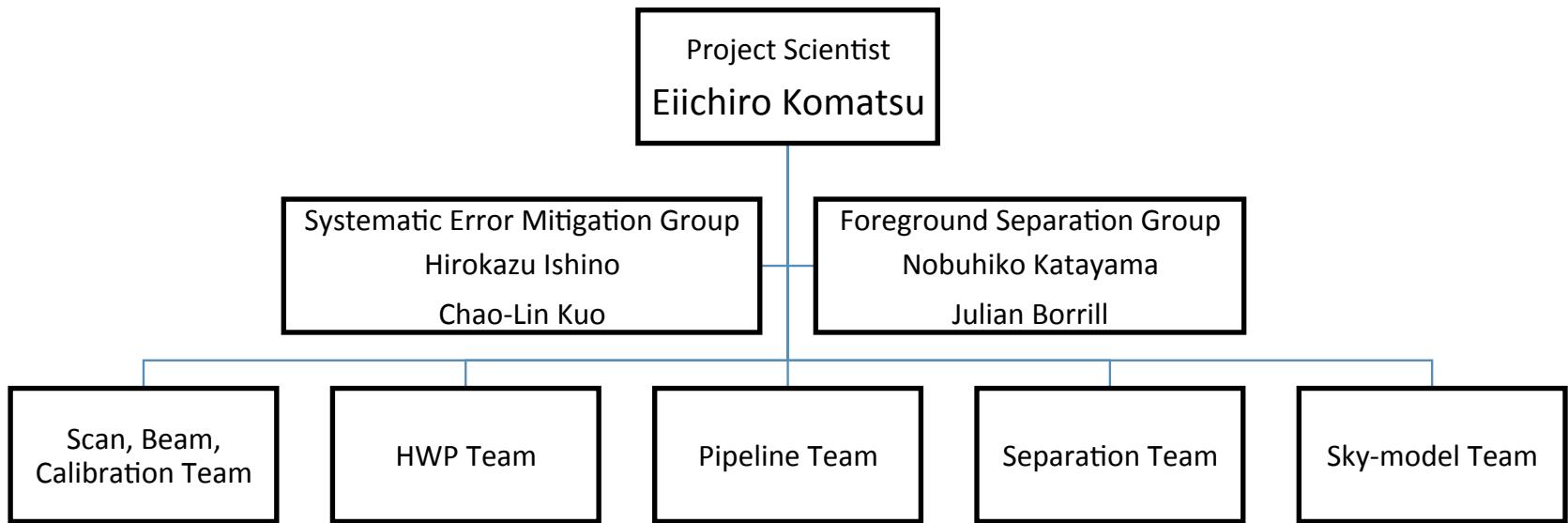


MPA
E. Komatsu

LiteBIRD Phase-A Organization



Joint study group (JSG)

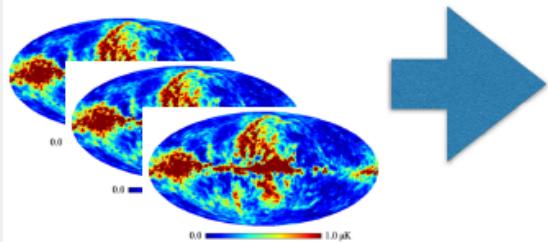
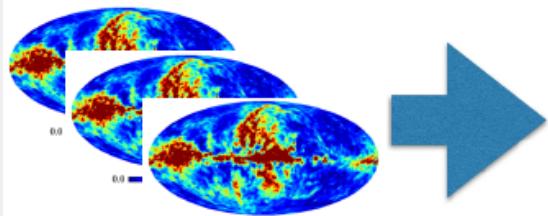
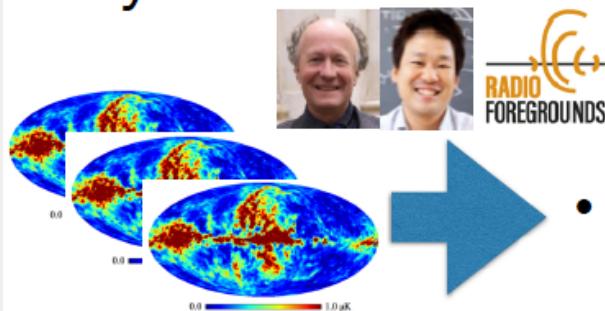


Conveners and Scopes

| Name | Japan | US | Scope |
|---|--------------------------------|----------------------------|--|
| Foreground Separation Group Conveners | Nobuhiko Katayama (Kavli IPMU) | Julian Borrill (LBNL) | Come up with a reasonable estimate of the foregrounds and algorithms to remove them, develop tools for simulation and analysis, come up with the requirements for the system |
| Systematic Error Mitigation Group Conveners | Hirokazu Ishino (Okayama U.) | Chao-Lin Kuo (Stanford U.) | Make a list of systematic errors and estimate each of them, evaluate mitigations with HWP (and other methods if needed), come up with the requirements for the system |

Foreground JSG

Variations of Sky Models



Variations of Methods

- Internal template



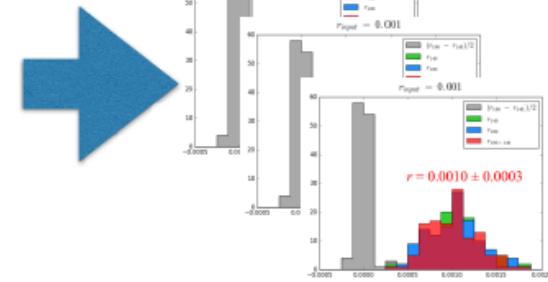
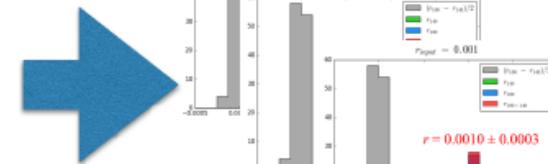
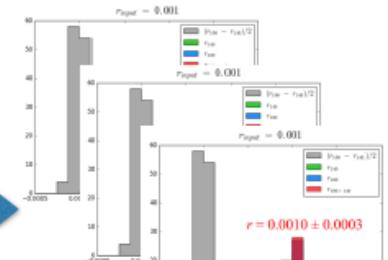
- NILC



- Parametric



Results



Systematics JSG

- End-to-End simulation(Tomo, Hirokazu, Satoru, Ryo, Julian, Ted, Chao-Lin et al.)
- HWP systematics (Tomo, Akito, Ted, Reijo, **Martin** et al.)
- Analysis w/o HWP (Chao-Lin, Sarah, Toshiya)
- 1/f noise mitigation (Hirokazu, Satoru, Chao-Lin, Sarah, Toshiya)
- Cosmic ray glitches (Tucker, **Jeffrey**, Chao-Lin, Atsuko)
- Radiation effect (Hirokazu, Tomo, etc.)
- Bandpass mismatch (**Guillaume**, **Hoang**, **Martin**, Tomo, Hirokazu)
- Side-lobe(Kimihiro, Tomo, Hajime, Yutaro et al.)
- Calibration studies (Satoru, Hirokazu, Tomo et al.)

I would like to add photos later.



B mode from Space Workshop @ Kavli IPMU
Dec. 10 – 16, 2015



Job openings

1. ISAS is hiring a professor who is expected to lead the development of the mission instruments on board LiteBIRD.
2. Kavli IPMU is hiring an associate professor dedicated for LiteBIRD.
3. With a fund from MEXT we recently hired 5 postdocs dedicated for LiteBIRD.
4. Kavli IPMU, along with Institute of Statistical Mathematics has an opening for postdoc on statistical cosmology to work on LiteBIRD data analysis (please let relevant people know!). The successful candidate can also work on Planck data analyses.

<http://www.ipmu.jp/en/job-opportunities/crest-fellows2016>

All these positions as well as future ads are open to the world, enhancing international cooperations.

2. LiteBIRD Phase-A1 goals on IC

- International partnership and responsibility sharing need to be agreed by the end of Phase-A1.
 - US through NASA, we already have good progress
 - McGill (through CSA)
 - Europe (through ESA):
We seek for a joint mission with European partnership. Full data access right is assumed.

Possible areas for sharing include

- HFT
- Cryogenics
- Computing
- etc.

We are very much interested in a proposal asking for a budget much smaller than M5 cost cap **for the joint mission with European partnership.**

This might or might not be coupled with M5.

M5 and Japan

- Letter from ISAS/JAXA director general (Sep. 2015) to the European CMB community tells everything on ISAS/JAXA intention. No change since then.
 - “Given the constraints, ISAS does care how focused the missions are. This is true even for the strategic L-class missions. ISAS finds the LiteBIRD proposal to focus on good science cases and is preparing to support its Phase-A study.”
 - “We feel it to be a quite natural, or indispensable, choice to baseline the overall design of the LiteBIRD according to the heritage of the ESA’s mission Planck. This strategy would become most fruitful when Europe-Japan collaboration is set-up for a focused CMB mission similar to the one described in the LiteBIRD proposal.”
- For M5, ISAS/JAXA has a firm commitment on SPICA.
- The LiteBIRD team is responsible for LiteBIRD phase-A1 with ISAS investment for design/development.
- Japan is NOT in a situation to join a COrE-like M5 proposal.
- This does not mean we do not seek for IC. International collaboration is essential. See the next page.

3. Future perspective on IC

- There are many cases we need to think.

| | Project A (space) | Project B (space) | Project C (space) | Project D (ground) | |
|--------|--|----------------------|----------------------|-----------------------|------|
| case 1 | ✓ | ✓ | ✓ | ✓ | |
| case 2 | Not only different combinations of check marks, there might be some effort for merging projects | | | | |
| | | | | | |
| case N | | | | | |

- We should seek for win-win relation in any case. We should develop good international collaborations in particular for young researchers, who are indeed our future.
- Good understanding of our timelines is necessary for productive discussions.