ULTIMATE-Subaru Collaboration Meeting 2018 (2018/1/16)

Discussion (II) - Science

Yusei Koyama (Subaru Telescope)

ULTIMATE-Subaru Science Team

Discussion Items

1. A/Is and (updated) timeline toward CoDR
2. Summarize requirements for ULTIMATE instruments
3. Identify weak points and missing science cases
4. How to establish network of our science team
5. Chair of Galactic team
6. Strong (and realistic) survey design for phase-I, II, III
7. Smaller issues (project website, science team wiki…?)

Anything else…?

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Work schedule toward CoDR 2018

2017

2018

2

3 — 3/22-24, International Science/Instrument WS: Announcement/invitation for new ULTIMATE science team, ask contribution with 1-page "white paper"

4 — Scientists: think about key science cases, new ideas (Phase-1)

5 — early-mid May: deadline of the 1-page white paper

6 — June: assign core person in each science case

7

8 — early-Aug : Science core member meeting (#1)

late-Aug : start working separately by each science team

9 — Science team: upgrading science cases (Phase-2)

10 — early-Oct: Science core meeting (#2) for interim report/discussion

11 — mid-Nov: Complete document from each science category

12 — early-Dec: Science core meeting (#3) to balance the sections

Science team: finalizing each section (Phase-3)

1 — **1/15,16 ULTIMATE "collaboration meeting 2018"** ← **We are Here !**

late-Jan: final version from each section

(Need update)

2 — late Feb: Complete editorial work within ULTIMATE team, circulate within science team

3 — Science team: Feedback phase (Phase-4)

late-Mar: Deadline for comments/feedback

4 — mid-Apr: Final version ready

5 — **CoDR (May/June 2018)**

Updated work schedule (2018-2019)

2018

11

12 ---------- Original submission deadline (from scientists to chair)

1 ← 1/15,16 ULTIMATE "collaboration meeting 2018" ← **We are Here !**

2 ---------- **New submission deadline from each team (2/16) !!**

3 ---------- early March: Circulate the compiled draft of science sections within the team (3/10)

4 ---------- **Final/fixed version from each team (4/20) !!**

5 ---------- May: Complete editorial work within ULTIMATE WG

6 ---------- early June: Circulate the final version of the draft (6/1)

---------- **late June: Send the science document to reviewers (6/30?)**

7 ---------- **ULTIMATE GLAO CoDR (mid July) !!**

8 ---------- Polish science requirement on instruments following the CoDR

9

2019

10 ---------- 1st announcement of ULTIMATE science WS (10/15?)

11 ---------- 2nd announcement of ULTIMATE science WS, registration open (11/15?)

12 ---------- Deadline for registration for science WS (12/15?)

1

2 ---------- **Feb 2019: Next ULTIMATE Science workshop ?**

TBD

Science document to be prepared by CoDR (July 2018)

1. Executive Summary
2. Science cases
   i. High-z imaging ← Recent HSC results?
   ii. High-z MOS
   iii. IFU ← Recent SAMI/MaNGA/KMOS results?
   iv. Nearby Galaxies
   v. Galactic Science
3. Science requirement for instruments
   i. Imaging: sensitivity, FoV, pixel scale, filter set, tunable filter
   ii. Spec: Wavelength coverage, resolution, multiplicity (spec)

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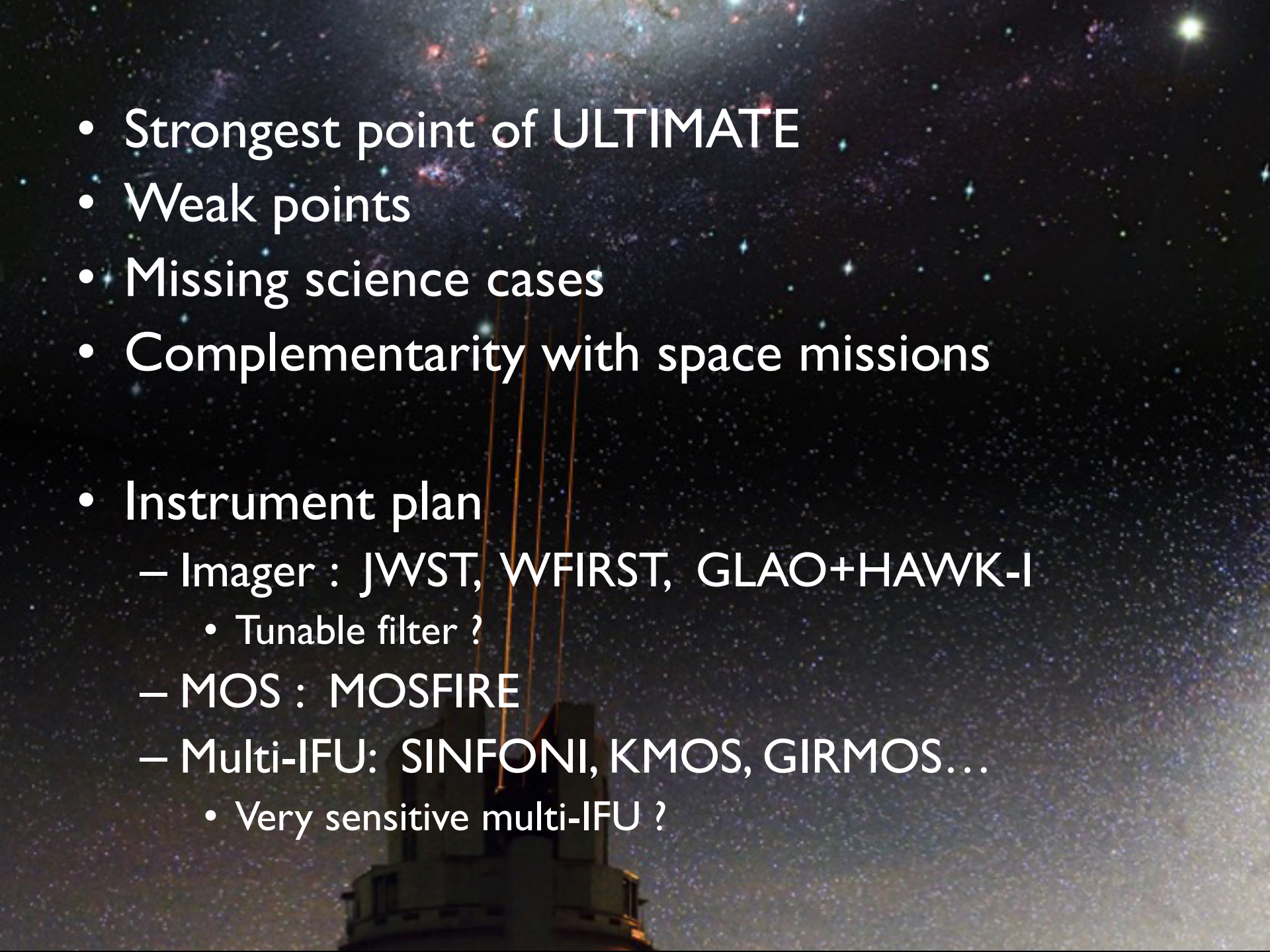


- Strongest point of ULTIMATE
- Weak points
- Missing science cases
- Complementarity with space missions

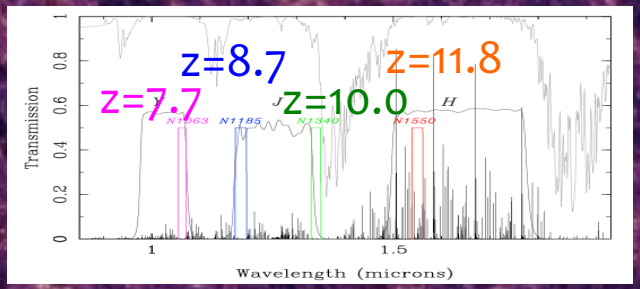
- Instrument plan
  - Imager : JWST, WFIRST, GLAO+HAWK-I
    - Tunable filter ?
  - MOS : MOSFIRE
  - Multi-IFU: SINFONI, KMOS, GIRMOS…
    - Very sensitive multi-IFU ?

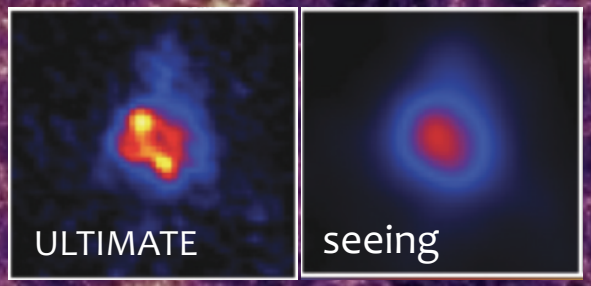
ULTIMATE-Subaru key science (mostly with high-z imaging)

"Birth, Life, Death" of galaxies in the cradle of large-scale structure

1. First galaxies (birth)

- Unprecedentedly deep NB imaging to detect galaxies a "cosmic dawn" (z>>7).
- Go beyond the depths of JWST.
- Extension of HSC optical NB survey



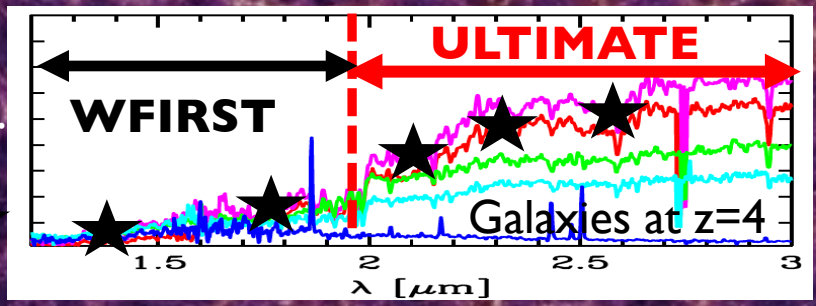


2. Stellar build-up (life)

- Origin of Hubble sequence: bulge, disk, and black hole growth
- Deep & sharp & panoramic NB imaging and 3-D spectroscopy of galaxies at "cosmic noon"(z=0.5-3.5)

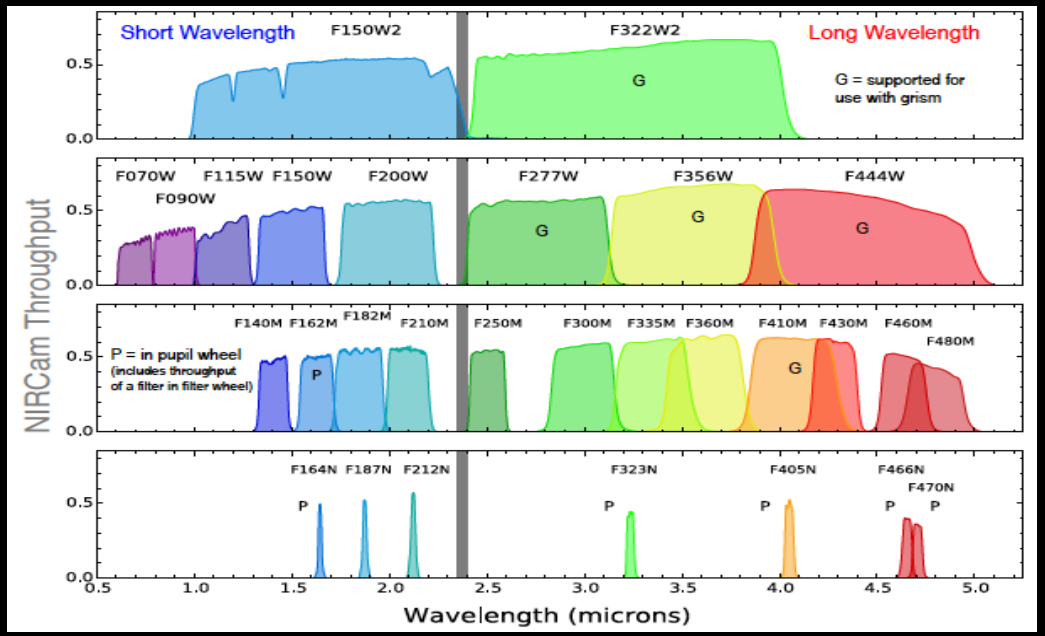
3. Quenching (death)

- Tracking down the "passive" galaxies to z~5 with deep BB/MB imaging (in K-band).
- Environment of dead galaxies: do first galaxies die in isolation or in clusters?
- Great synergy with WFIRST.



Advantage/complementarity with other space/ground-based facilities

- JWST (NIRCAM):
  - Only 3 NB filters at 1.6<l<2.2um (no NB at l<1.6um)
  - No medium-band filters.
  - ULTIMATE has ~20 times wider FoV.



Filter	Sensitivity Point source S/N=10 in 10 ks	Saturation G2V star 80% full well 2 reads of 64x64 subarray
F070W	22.5 nJy	K ~ 9.0 Vega
F115W	13.2 nJy	K ~ 9.6 Vega
F200W	9.1 nJy	K ~ 9.3 Vega
F210M	14.9 nJy	K ~ 8.4 Vega
F212N	129 nJy	K ~ 5.6 Vega
F277W	14.3 nJy	K ~ 9.6 Vega
F3222W2	9.1 nJy	K ~ 10.0 Vega
F356W	12.1 nJy	K ~ 8.9 Vega
F444W	23.6 nJy	K ~ 8.0 Vega

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Science team organization toward CoDR2018

Project scientist
(editor chair, Koyama)

?

High-z Imaging (Kodama)

Hayashi
Iwata
Kikuta
Kohno
Koyama
Y.T. Lin
Matsuda
Minowa
*Onodera
*Shibuya
Shimakawa
T. Suzuki
*I. Tanaka

High-z MOS (Tadaki)

Akiyama
Hayashi
Matsuoka
Nagao
Nakajima
Onodera
Shibuya
Masayuki Tanaka
Toba
Yabe

IFU spectroscopy (Lidman)

Bian
Bryant
Bloom
Casey
Croom
Leslie
Nataf
Kewley
I.T. Ho
Shaefer
Shimakawa
Yuan

Nearby galaxies (Motohara)

Iono
Kaneko
J, H, Kim
Koda
*Koyama
Saito
Sorai
Takeuchi
Masaomi Tanaka
I. Tanaka
J. Ueda
Yamashita

Galactic / Local Group (Koyama)

Chiba
Fukui
Guyon
Koshimoto
C. H. Lee
Matsunaga
Nishiyama
Oasa
Pyo
Sumi
D. Suzuki
Terai
Torii
Yasui

- "Interface" scientist in each partner?
  - Japan; Y. Koyma
  - Taiwan: Y.T. Lin
  - Australia: C. Lidman
  - Canada: any good candidate?

- Some regular telecon for science core members (i.e. chief of each science section + representative of each partner) ?

- Broader support from the community

- Workshop / next meeting in ~1-year time scale?

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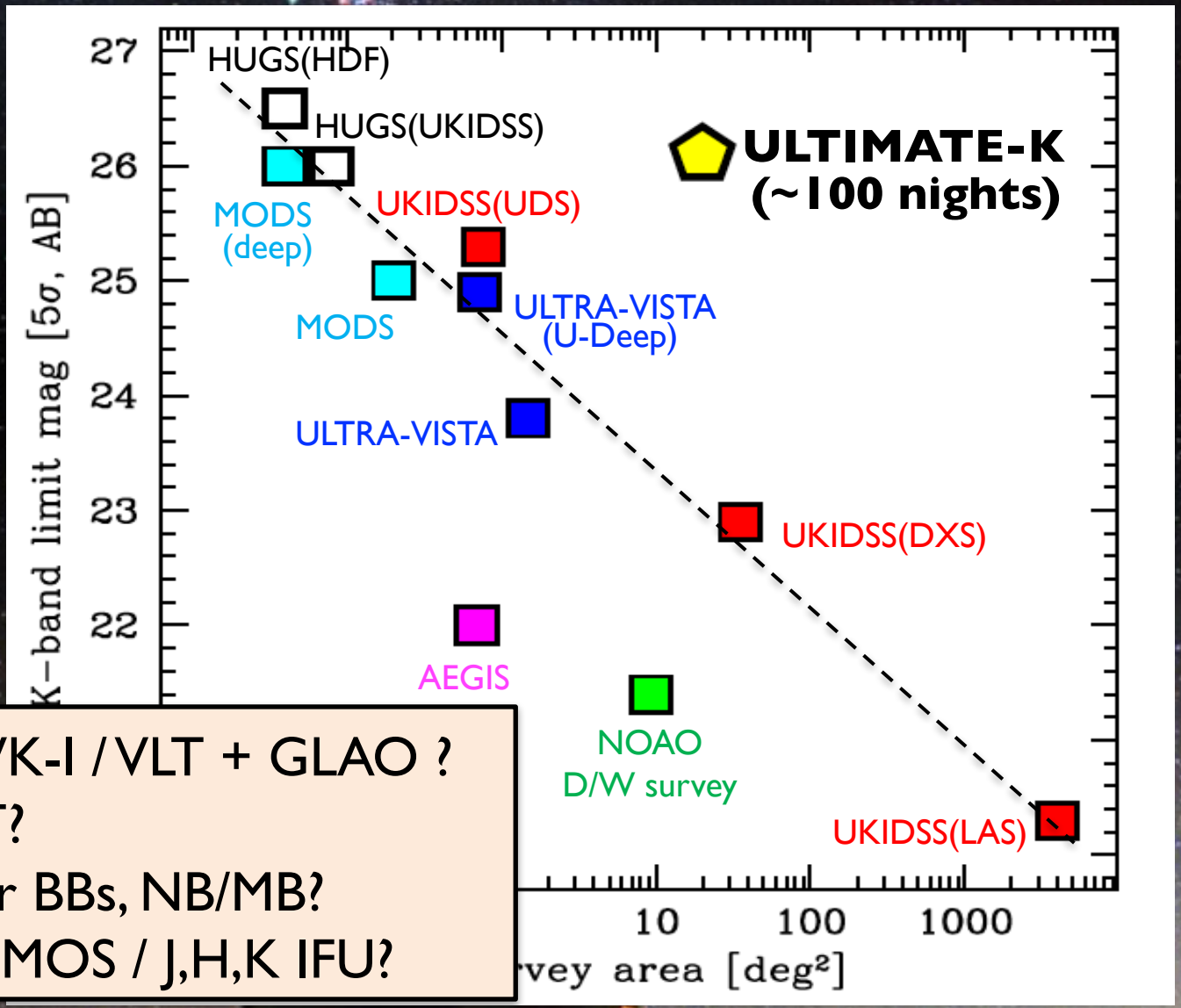
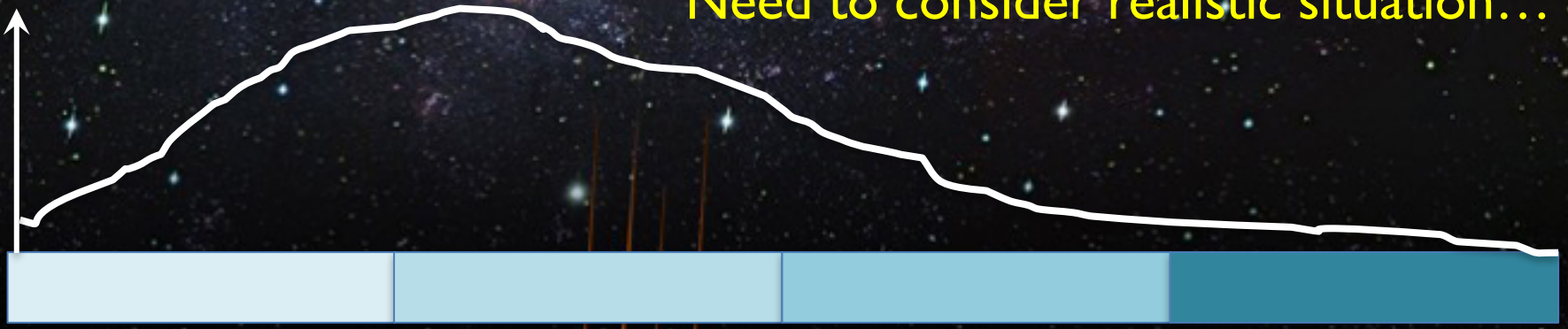
K-band deep/wide survey



- HAWK-I / VLT + GLAO ?
- JWST?
- Other BBs, NB/MB?
- H+K MOS / J,H,K IFU?

Survey design (SSP with WFC+GLAO)

Need to consider realistic situation…



0.1” 0.2” 0.3” 0.4” 0.5”

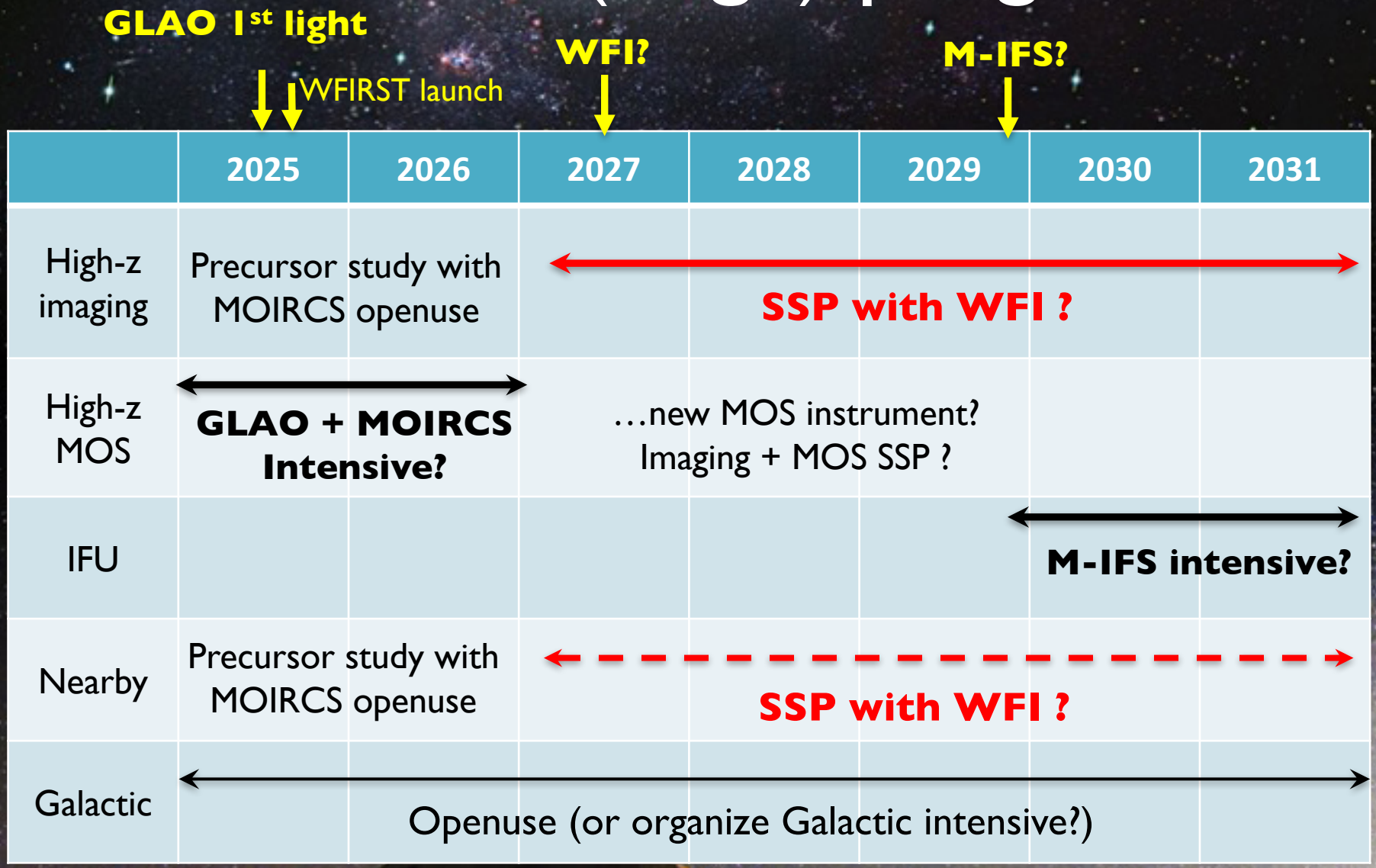
U-Deep (~30%?)

Deep (~30%?)

MOS? Nearby galaxies? (~30%?)

Galactic (Openuse?)

Timeline of (large) programs?



PFS SSP

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