

SKACH Science Program Overview

Prepared by Miroslava Dessauges (Chair, UniGE)
Devin Crichton and Marta Spinelli (Co-Chairs, ETHZ)

SKACH Science Program Objectives

The purpose of the SKA Switzerland (SKACH) Science Program is **oversight of all consortium science efforts related to SKAO and SKA Region Center (SRC) activities.**

The Science Program shall:

- ◆ acquire a global view of different on-going science activities related to SKA in Switzerland
- ◆ follow their progress
- ◆ follow changes/updates in their initial aimed goals
- ◆ foster interactions and collaborations between researchers with regular (remote) meetings [the frequency of the meetings has still to be defined]
- ◆ propose recommendations to the board (if needed/helpful)

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→ To achieve these objectives we need your help!

The Science Program committee would like first to draw up a list of all active researchers (from permanent staff to PhD students) from the Swiss Universities/Institutes who are dedicating some of their time to SKA-related science.

Large on-going SKA-related science activity: 'AstroSignals'

Interdisciplinary SNF Sinergia grant:

AstroSignals — A New Window on the Universe, with the New Generation of Large Radio-Astronomy Facilities

PI: J.-P. Kneib (EPFL) / **Co-PIs:** R. Feldmann (UniZH), A. Refregier (ETHZ), D. Schaerer (UniGE)

Partners:

FHNW: A. Csillaghy

EPFL: F. Courbin, C. Gheller, P. Jablonka, Y. Revaz, J. Schober, J.-Ph. Thiran, M. Vetterli

UniGE: M. Dessauges-Zavadsky, S. Voloshynovskiy

UniZH: M. Boehlen, L. Mayer

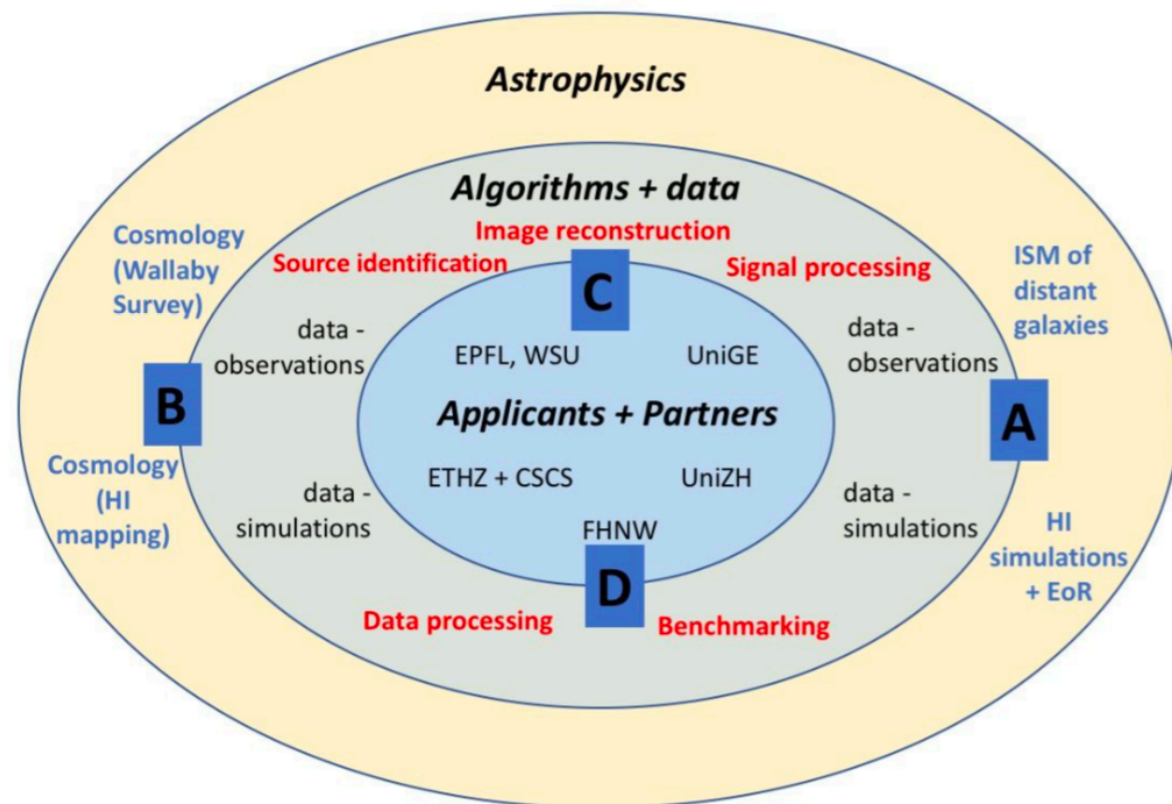
Starting date: June 1, 2021 / *Duration:* 48 months

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Research Projects



A. The interstellar medium of distant galaxies

A1. Neutral hydrogen in resolved high-z galaxies as a new testbed for galaxy formation and evolution

A2. Interferometric observations and new algorithms to understand star-formation and the ISM of distant galaxies

B. Probing cosmology with HI mapping and ultimately radio weak lensing

B1. Cosmological simulations

B2. Cosmological HI mapping

B3. Optimal weak lensing in radio-interferometric data

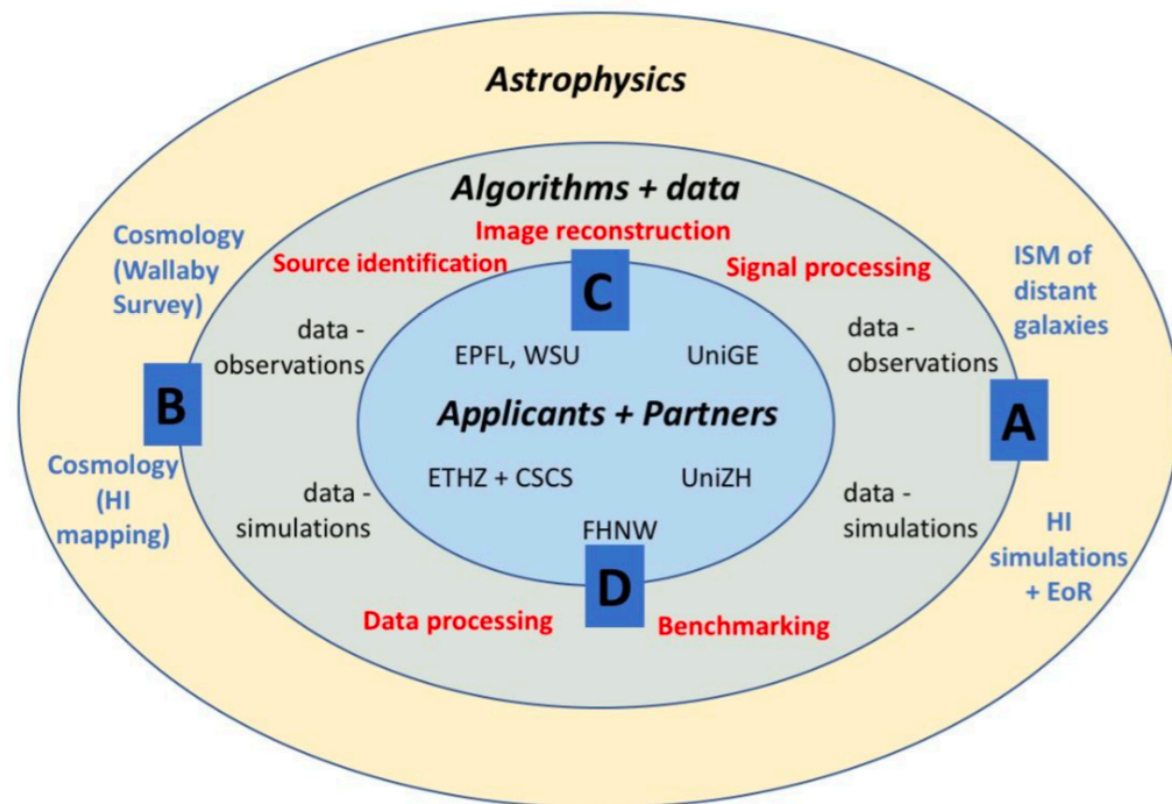
B4. HI galaxies in the ASKAP-Wallaby survey and cosmological measurements

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C. Image reconstruction & source identification/characterization algorithms

C1. Efficient and accurate HPC *Spherical* imaging together with calibration

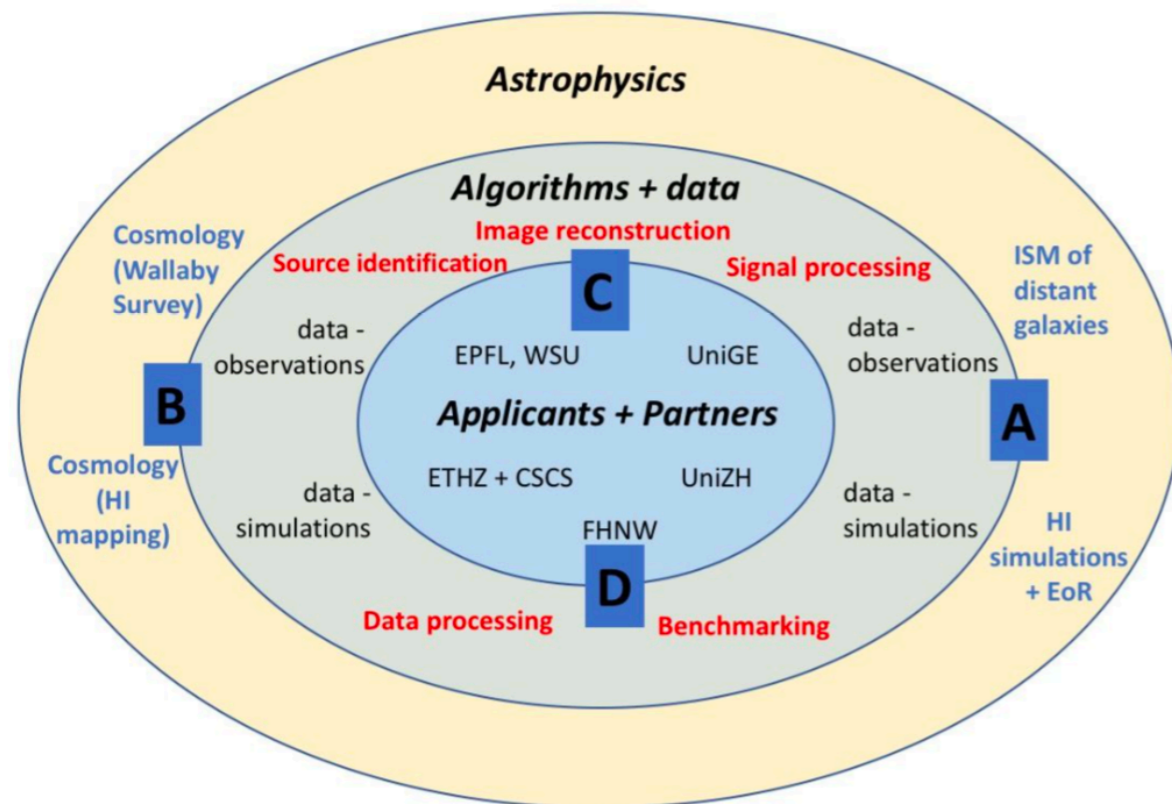
C2. Sparse sampling techniques for interferometry

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D. IT implementation and optimisation

D1. Benchmarking tools (FHNW + EPFL)

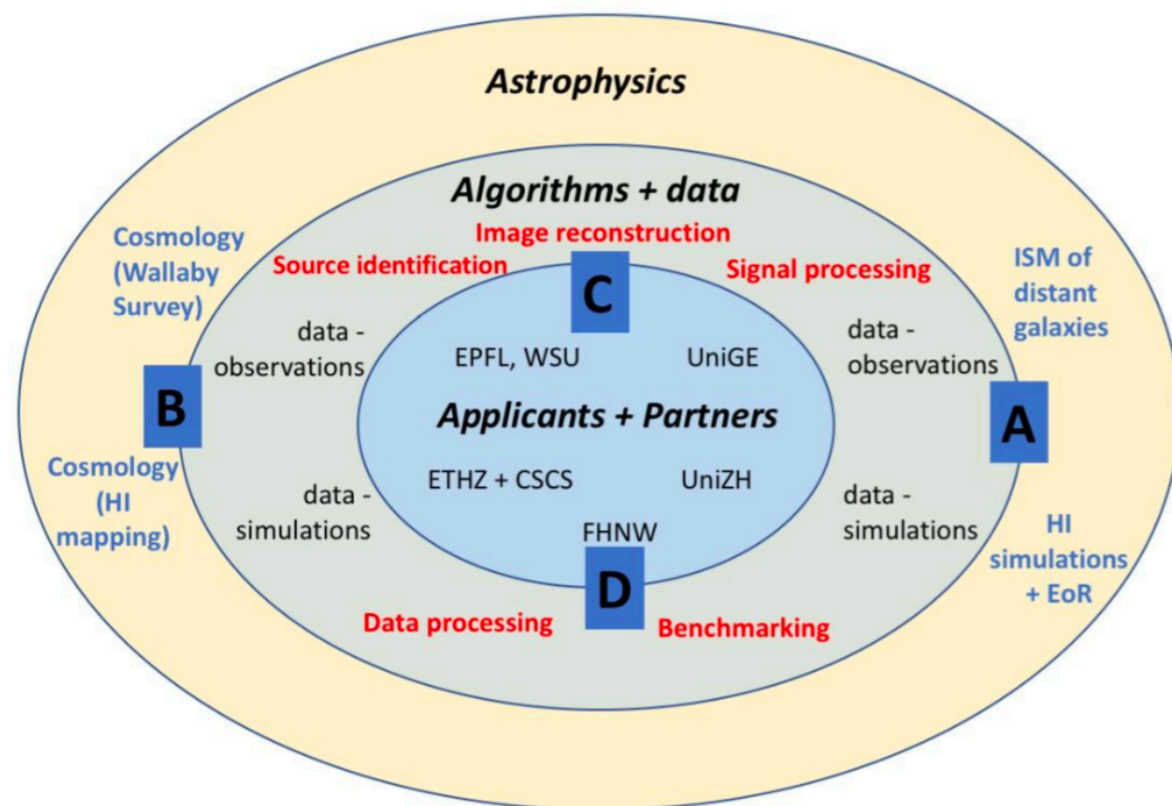
D2. Efficient processing of ASKAP interferometric data and data simulations

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D2. Efficient processing of ASKAP interferometric data and data simulations

◆ 16 staff members from 5 institutions
◆ 2 PhD students + 7 postdocs
+ 1 data scientist on the Sinergia grant

Survey of the SKA-related science activities

With the aim to identify all active researchers in SKA-related science among the SKACH members (connected or not to AstroSignals), we have launched on May 10th **a Science Program survey**.

The Science Program survey was filled in by 23 SKACH members.

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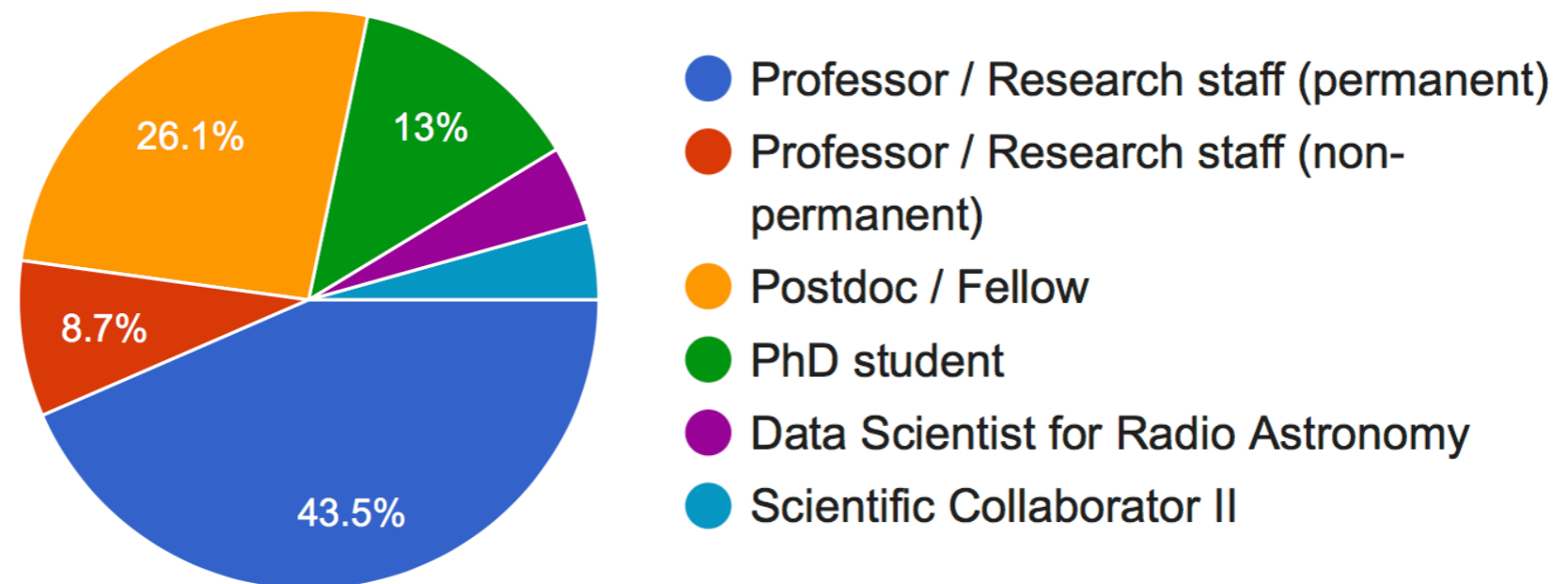
The Science Program survey was filled in by 23 SKACH members.

Here is a summary of the results:

Institution of the respondents

EPFL (6)	UniGE (6)	FHNW (1)	ISSI (1)
ETHZ (3)	UniZH (4)	HESSO/HEIG-VD (1)	UniBS (1)

Academic status of the respondents



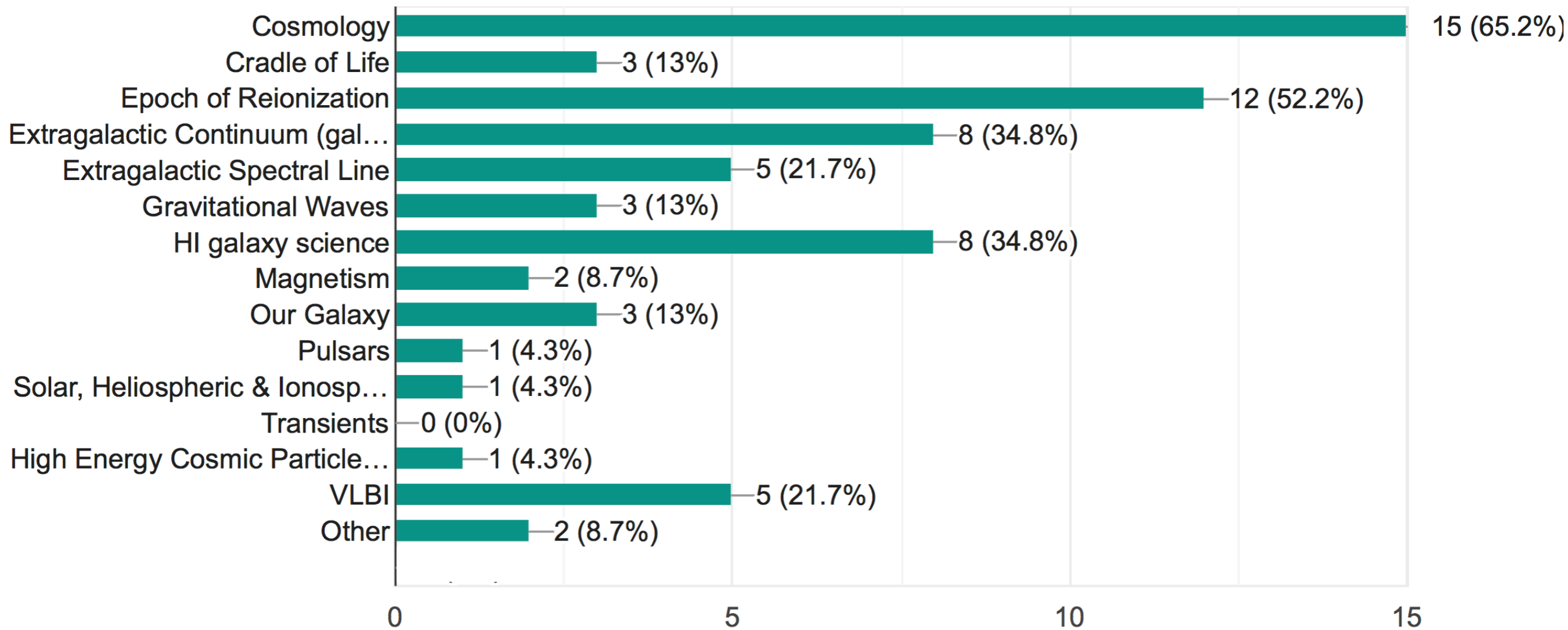
16 out of 23 respondents are part of AstroSignals: 6 in the Research Project A / 7 in B / 6 in C

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Here is a summary of the results:

Interest of the respondents into the following SKA Science Working Groups



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Here is a summary of the results:

Census of the current SKA-related science research of the respondents

- Solar science [Rohit Sharma talk]
- Star formation including protoplanetary disks
- ISM (HI+H₂) of distant galaxies, galaxy formation and evolution, kinematics [Mark Sargent talk]
- HI content of galaxies in cosmic filaments
- AGN feedback
- HI intensity mapping, 21cm cosmology, weak lensing [Devin Crichton talk]
- Galaxy formation simulations, HI mocks, contribution from dwarfs [Yves Revaz talk]
- Simulations of the HI distribution in the Universe after the reionization
- 21cm intensity mapping simulations [Sambit Kumar Giri talk]
- Counterparts of gravitational wave sources [Lucio Mayer talk]
- Radio data simulations, radio technique, ML/AI, pipelines
- Instrument simulations
- Data visualisation [Arpan Das talk]

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Please, help us to create a lively environment for the SKA-related science activities in Switzerland with a lot of productive interactions and collaborations.

Here is the link to the Science Program survey:

<https://forms.gle/UFKgRRHdEf9wHMyL6>

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mspinelli@phys.ethz.ch