

Astrophysics at UKZN

Caroline Zunckel

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Astrophysics and Cosmology Research Unit (ACRU) at UKZN



- Research group overview
- Growing Astronomy at UKZN
 - Undergraduates
 - Postgraduates
 - Outreach program
 - Building new links to other groups
 - Building existing links to Astronomy projects
- Summary

Research Overview



Our group:

Staff: 8 permanent staff members (7 in Maths, 1 in Physics), research professor and 1 faculty member in the process of accepting

- 2 of these new lecturer positions funded by SKA SA for 5 years made into permanent positions by UKZN
- Huge impact in terms of reaching critical mass for postdoctoral mentoring, undergraduate and postgraduate supervision

Postdocs: 6 current postdocs (1 more to join at the end of this year, making 7 offers for 2014)

Students: ~15 postgraduate students

Research Overview



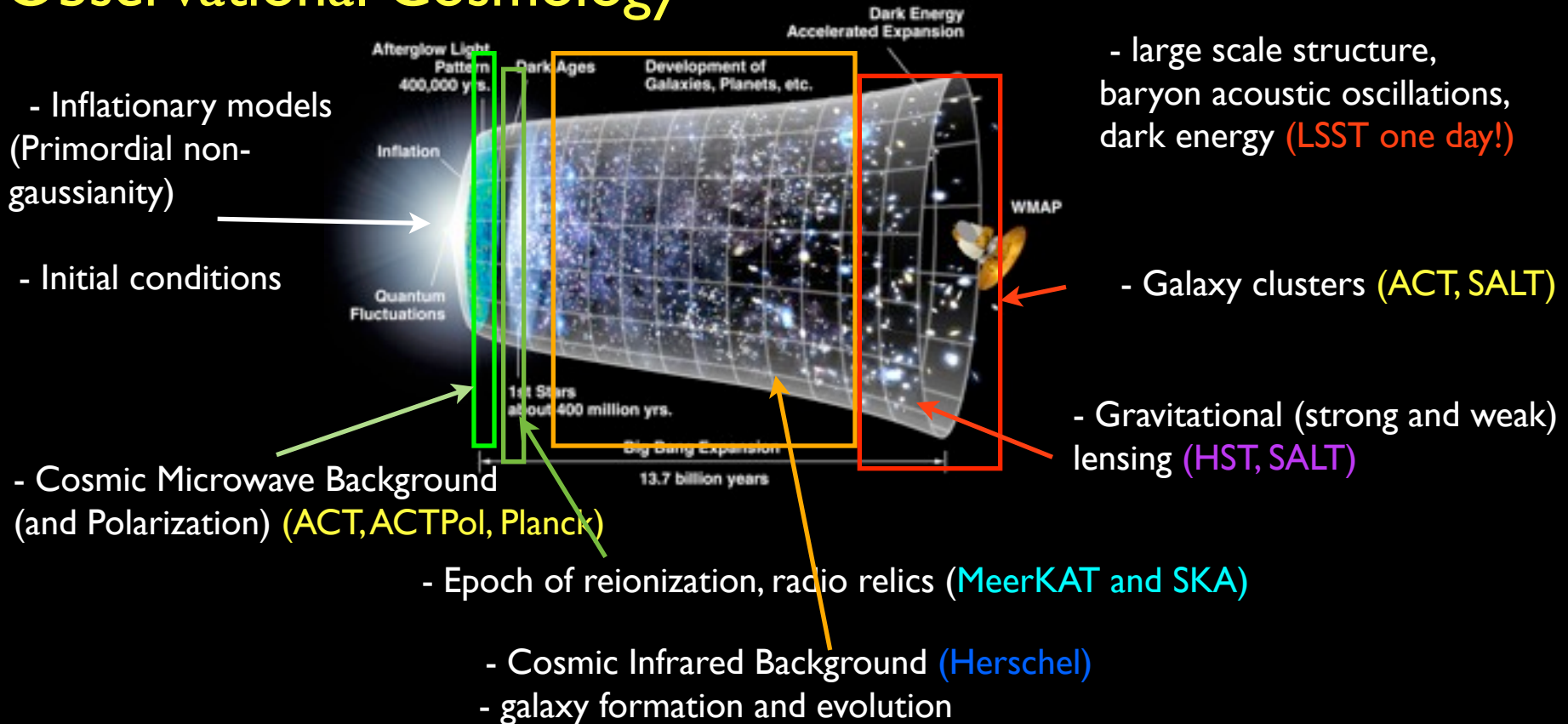
Observational Cosmology

- focussed on doing high-impact science using multi-wavelength data from a number of experiments

Research Overview



Observational Cosmology



- Inflationary models (Primordial non-gaussianity)

- Initial conditions

- Cosmic Microwave Background (and Polarization) (ACT, ACTPol, Planck)

- Epoch of reionization, radio relics (MeerKAT and SKA)

- Cosmic Infrared Background (Herschel)

- galaxy formation and evolution

- large scale structure, baryon acoustic oscillations, dark energy (LSST one day!)

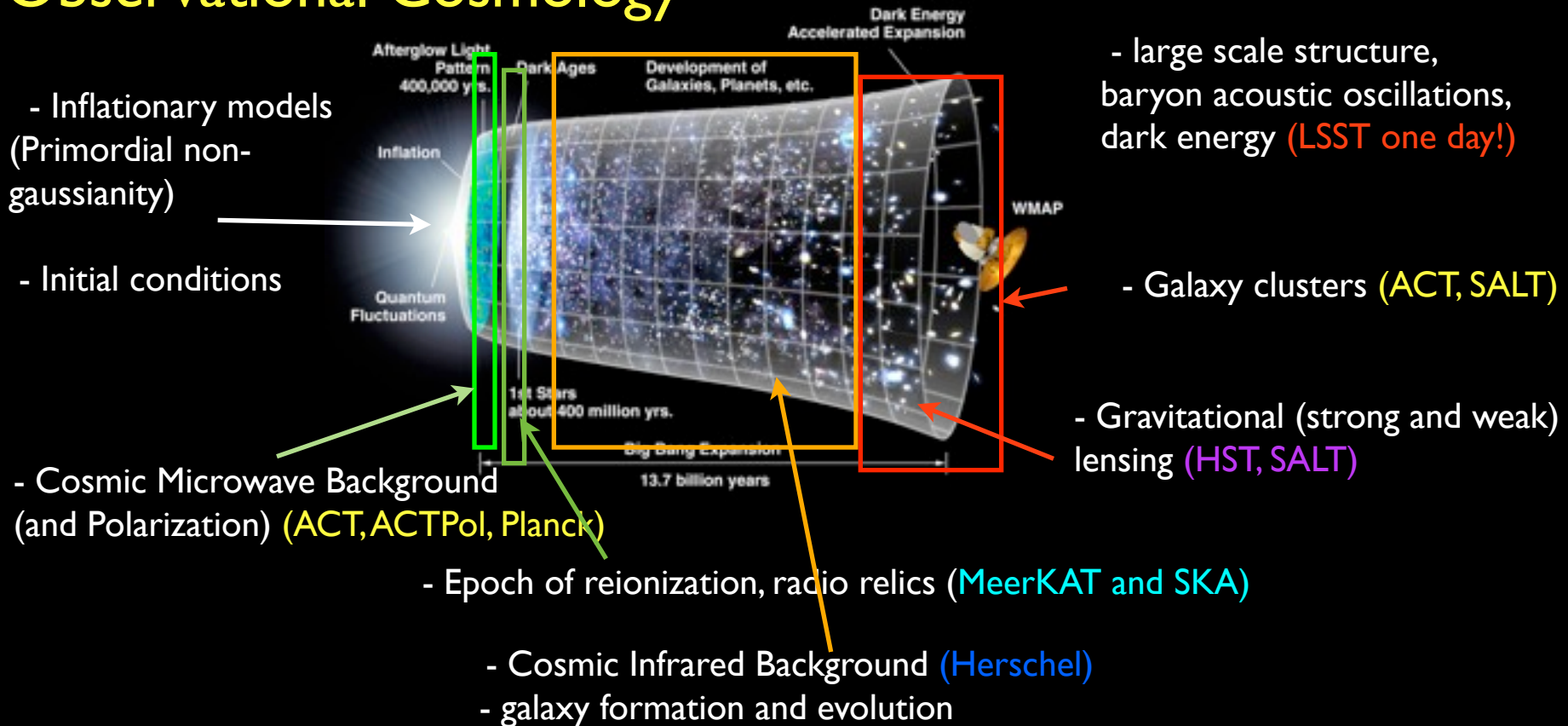
- Galaxy clusters (ACT, SALT)

- Gravitational (strong and weak) lensing (HST, SALT)

Research Overview



Observational Cosmology



High performance computing, Instrumentation

Growing Astronomy at UKZN



Undergraduates:

- encouraging an interest in astronomy
- start training in astronomy early on in careers

SKA Undergraduate programme:

- Block grant given to UKZN in 2010 - 2012
- Supports 4 new bursary students each year
- Currently 10 SKA bursars at UKZN
- Included 3 Botswana undergraduates doing science and engineering degrees

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Undergraduates:

Undergraduate Internship program (UIP)

- In order to help our undergraduate bursars to excel, ACRU (staff and students) run a mentorship and specialized tutoring programme
 - Tutoring (Over and above university tutoring)
 - Examination and test revision
 - Mentoring
 - involvement in outreach program



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Undergraduates:

Undergraduate Internship program (UIP)

- other students with an interest in pursuing a career in Astrophysics or related fields have been given the opportunity to join our UIP
- 3 additional students without bursaries have been recruited into this program



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Undergraduates:

Recruitment of undergraduates:

1. New courses in Astronomy

- 2nd year course in *Introductory Astrophysics*
- 3rd year course in *Mathematical methods in Astronomy*

2. Summer project program

- introduce students (SKA bursars at the moment) to research
- hope to extend this to other undergraduates

3. Outreach program (with expand on this later)

- target schools

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Postgraduates:

- currently +/- 15 students
- increase their exposure to topics in astronomy
 - weekly group meetings
 - journal club
- **Recruitment drive:** Expanding this number by targeting funding sources other than NRF
 - eg. offer SKA and NASSP postgraduate projects

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Outreach program:

- astronomy workshops during university vacations
- various public lectures (talks at schools, conferences in other fields)
- many student visits for work experience
- plan to start a series of public lectures on interesting topics, followed by telescope viewing session
 - ACRU career week (recruit students into our undergraduate program)

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Building new links to groups:

In addition to our current collaborations:

- building strong regional links with DUT
 - provide technological training to complement our theoretical program
- plan to build on the natural links with the group at Wits in terms of multi-wavelength cosmology

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Building links to projects such as SKA

- Awarded bid to host student radio workshop in 2013 (funded by SKA)
 - contextualize learning & build astrophysics background and relevant skills
 - expose students to high profile international radio astronomers
 - establish links with academics and advanced undergrad/postgrad students in African partner countries
 - **establish KZN as a hub of radio astronomy**

Summary



What we can offer NASSP North?

- Have reached capacity in terms of faculty
 - can offer courses in theoretical & observational cosmology
- can offer interesting and high-impact research projects based on high-precision multi-wavelength data
- Have strong existing outreach program
 - could be useful in terms of outreach for NASSP North

Summary



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Thanks!