



Leibniz-Institut für
Astrophysik Potsdam

ISC proudly presents:

2. AIP-Jamboree, September 12, 2014

The rules of the game:

- *2 minutes (2 slides)*
- *Present yourself and your work*
- *Get to know the colleagues*

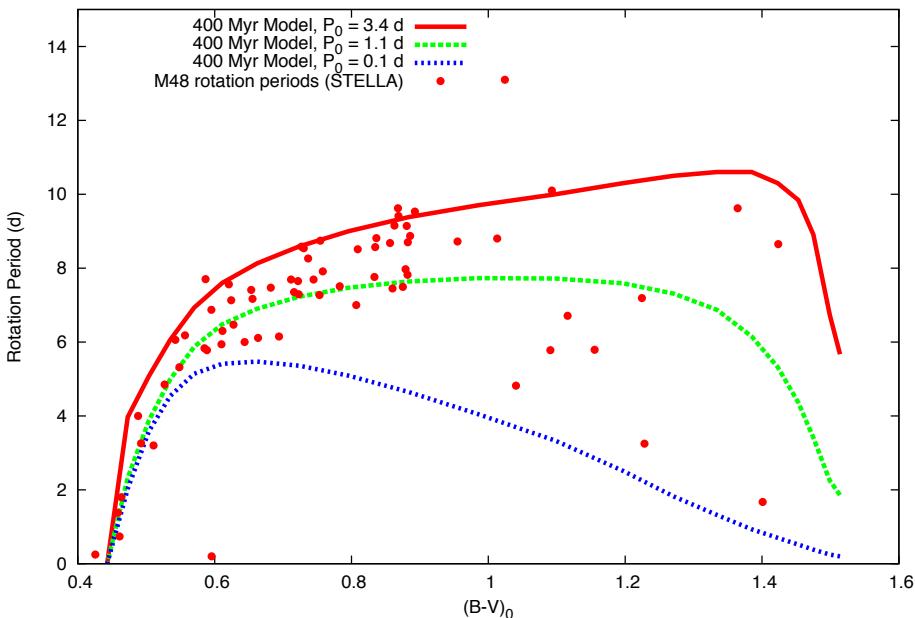
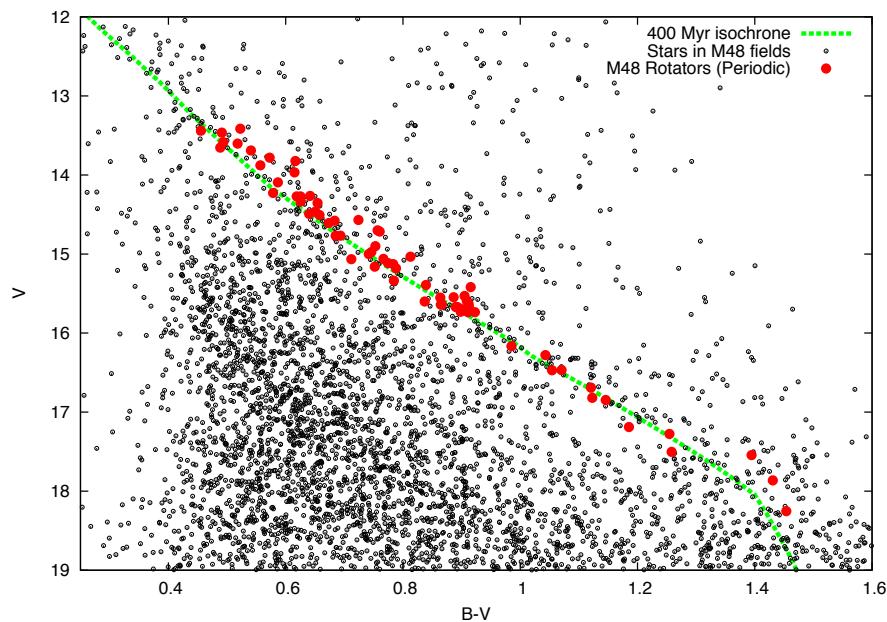
Sydney Barnes

Stellar physics

Color-Magnitude Diagram



Color-Period Diagram



It is difficult to derive ages for main sequence field stars.

They require the distance to the star.

A star's rotation period can also specify its age.

It is distance-independent.

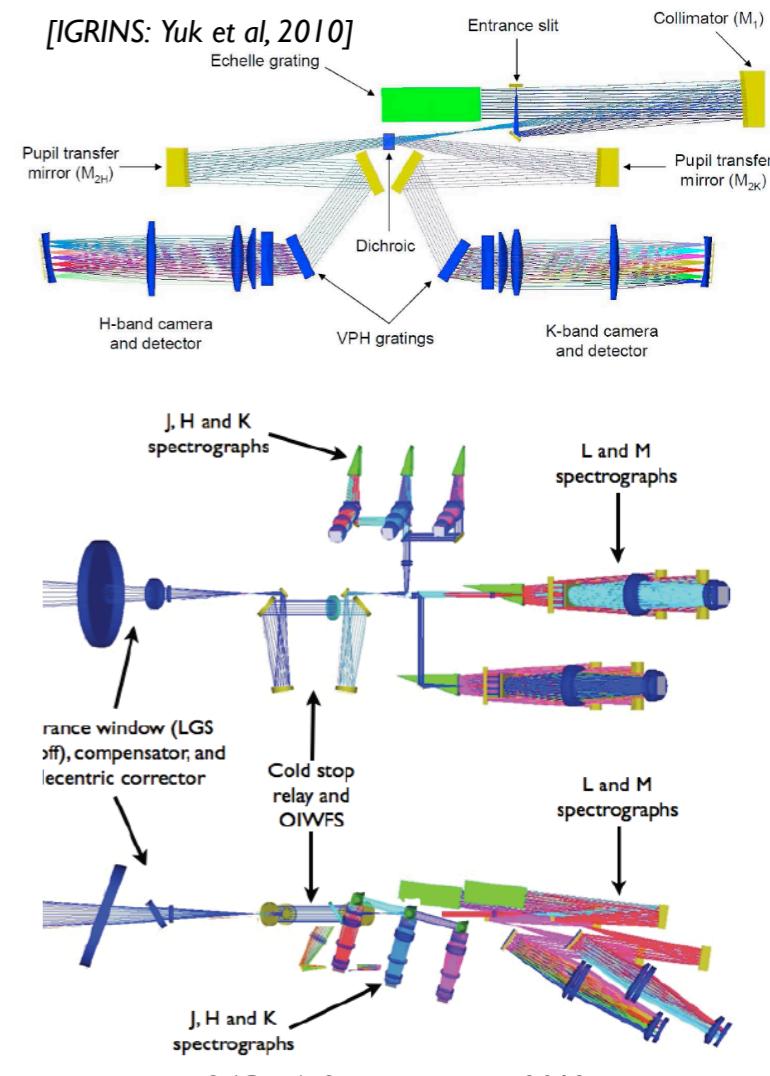
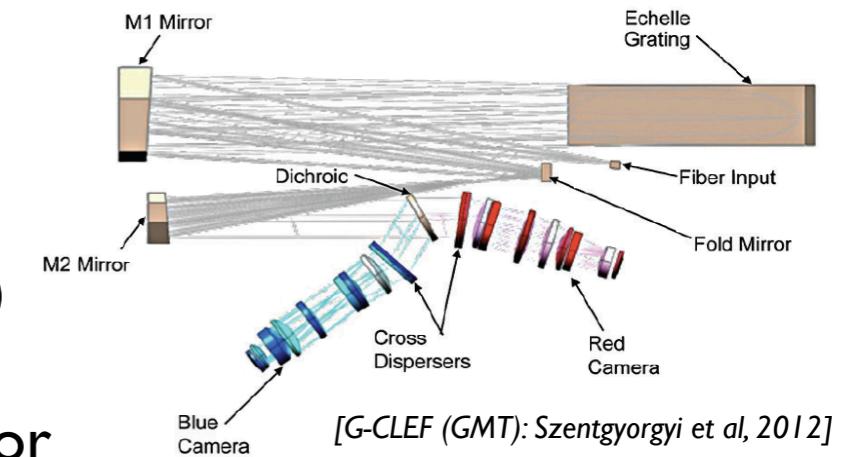
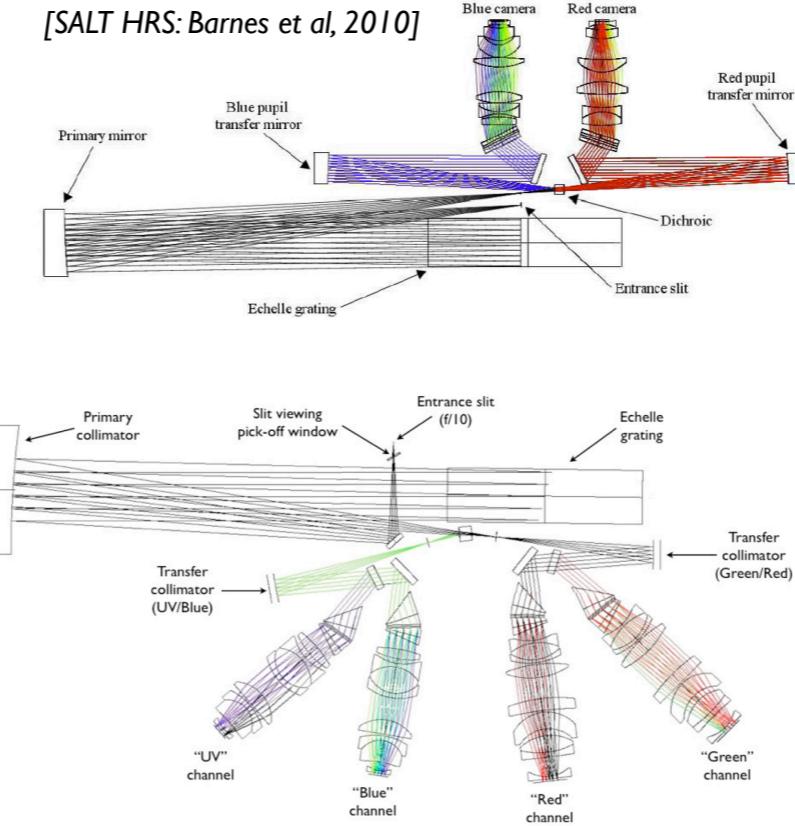
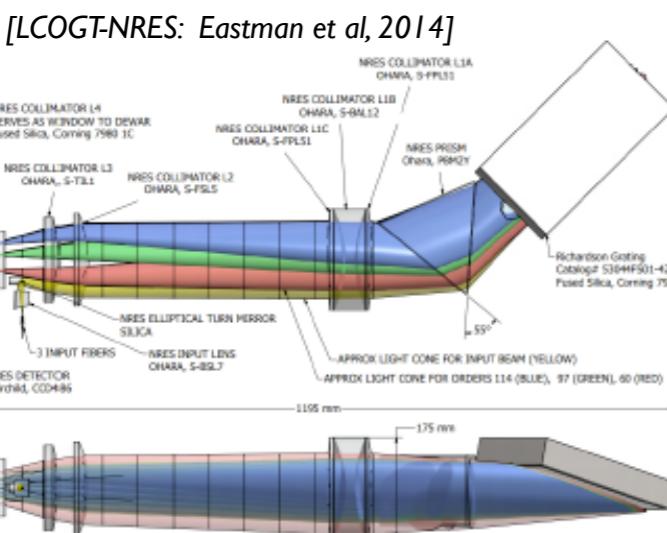
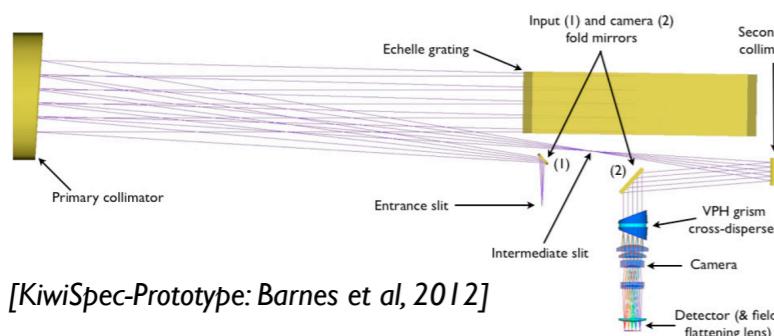
Need 1. measured period and 2. model.

Stuart Barnes

High-res Spectroscopy

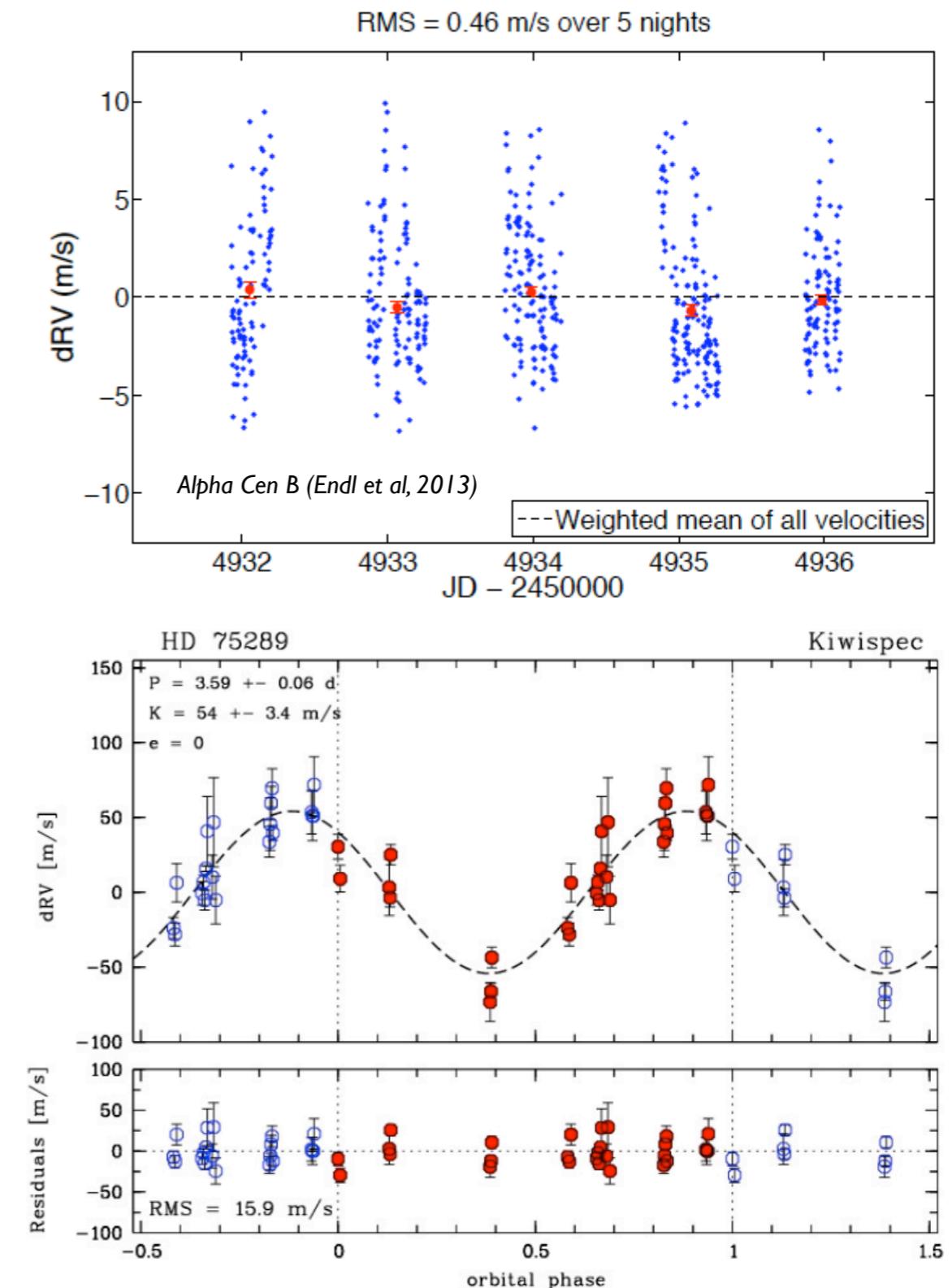
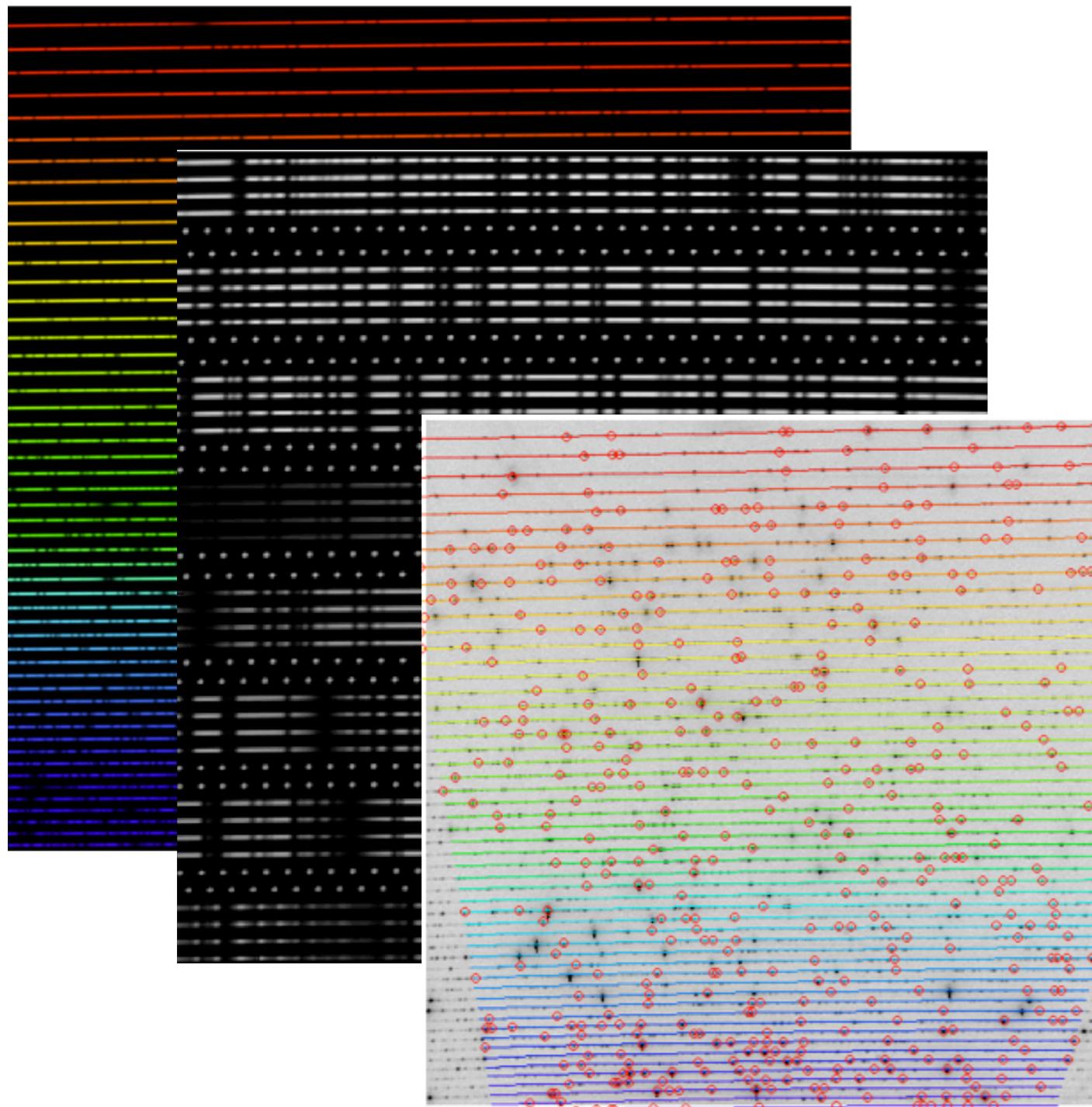
Stuart Barnes: “Optical Designer” (& PhD astronomer)

- Postdoc/Research Scientist at McDonald Observatory (Texas) & AAO (Australia).
- Independent Contractor (New Zealand & The Netherlands).
- Started at AIP July 1st, 2014 (“High Resolution Spectroscopy”)
- A selection of past (and ongoing) projects [commissioned and/or post-“Phase A”]:



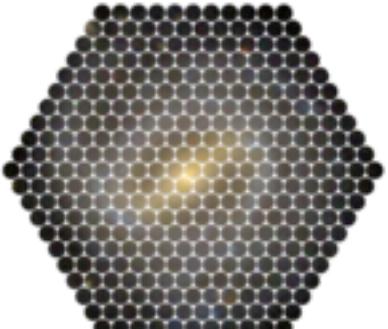
Other “interests”:

- High fidelity instrument data simulation (using ray-tracing methods)
- Exo-planet precision radial velocities (with “large” and “small” telescopes)
- ... other astronomical instruments ...

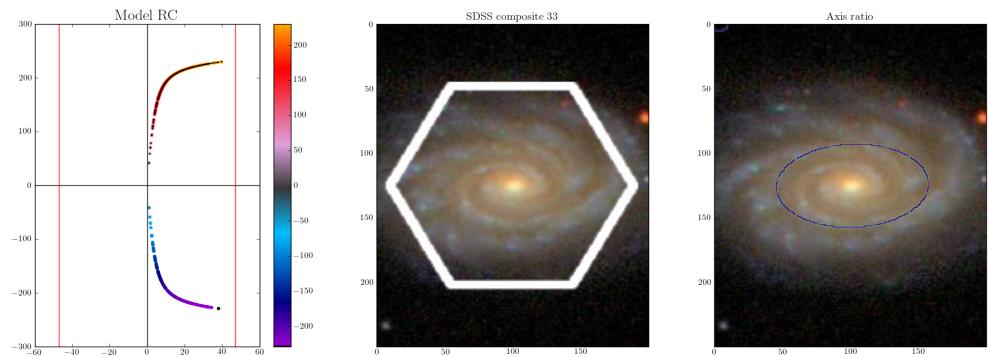
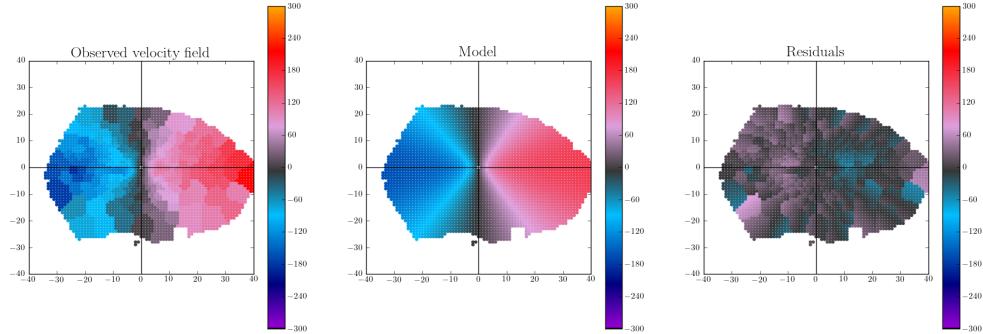


Simona Bekeraite

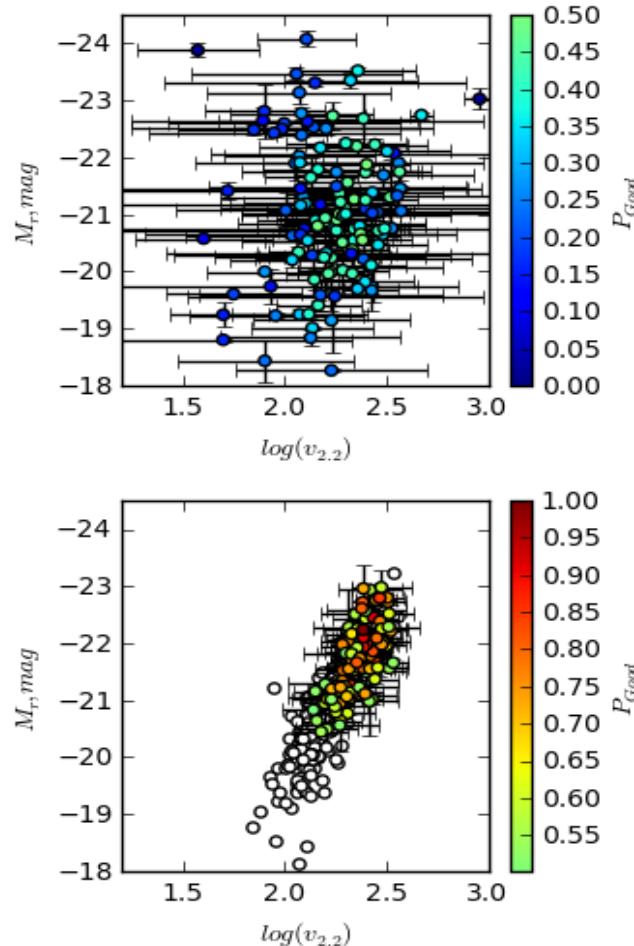
innoFSPEC



CALIFA Survey

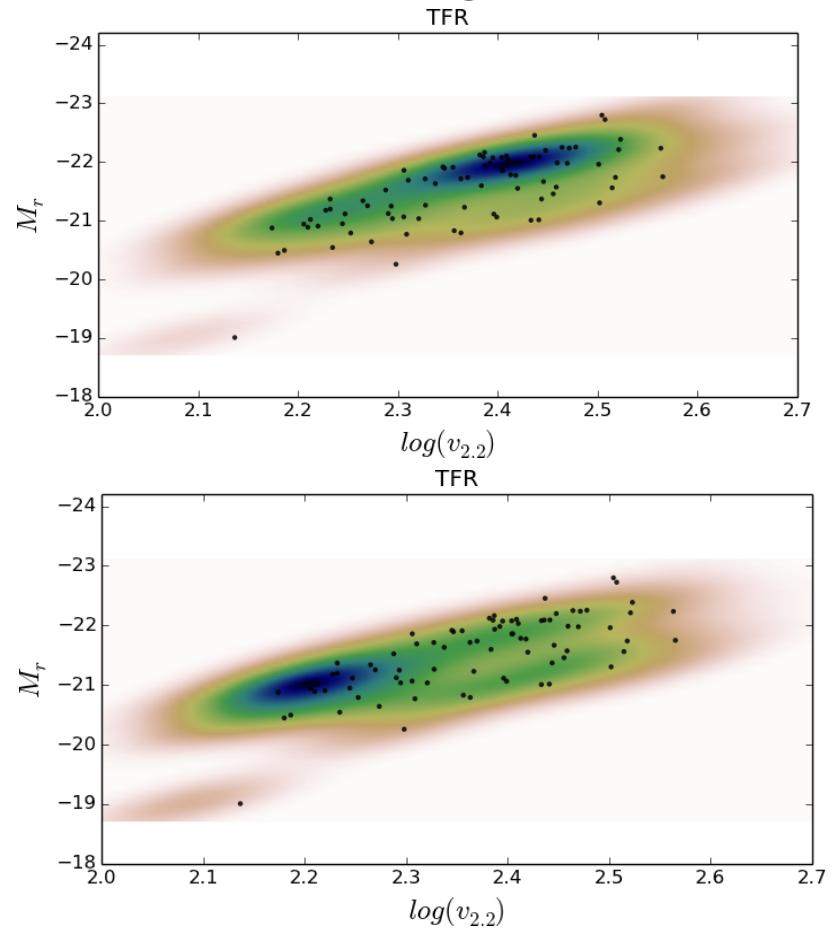


- Mostly working within CALIFA
- Using stellar velocity fields to determine the 'true', volume- and large-scale structure-corrected Tully-Fisher relation
- IFU data: Detailed velocity field information: we can distinguish between disk galaxies, mergers and slow rotators
- Consistent modelling and realistic uncertainties of velocity fields parameters using MCMC



- Reproducible, non-arbitrary sample selection: modelling the $M_r - v_{\text{rot}}$ distribution as a mixture of 2 Gaussians

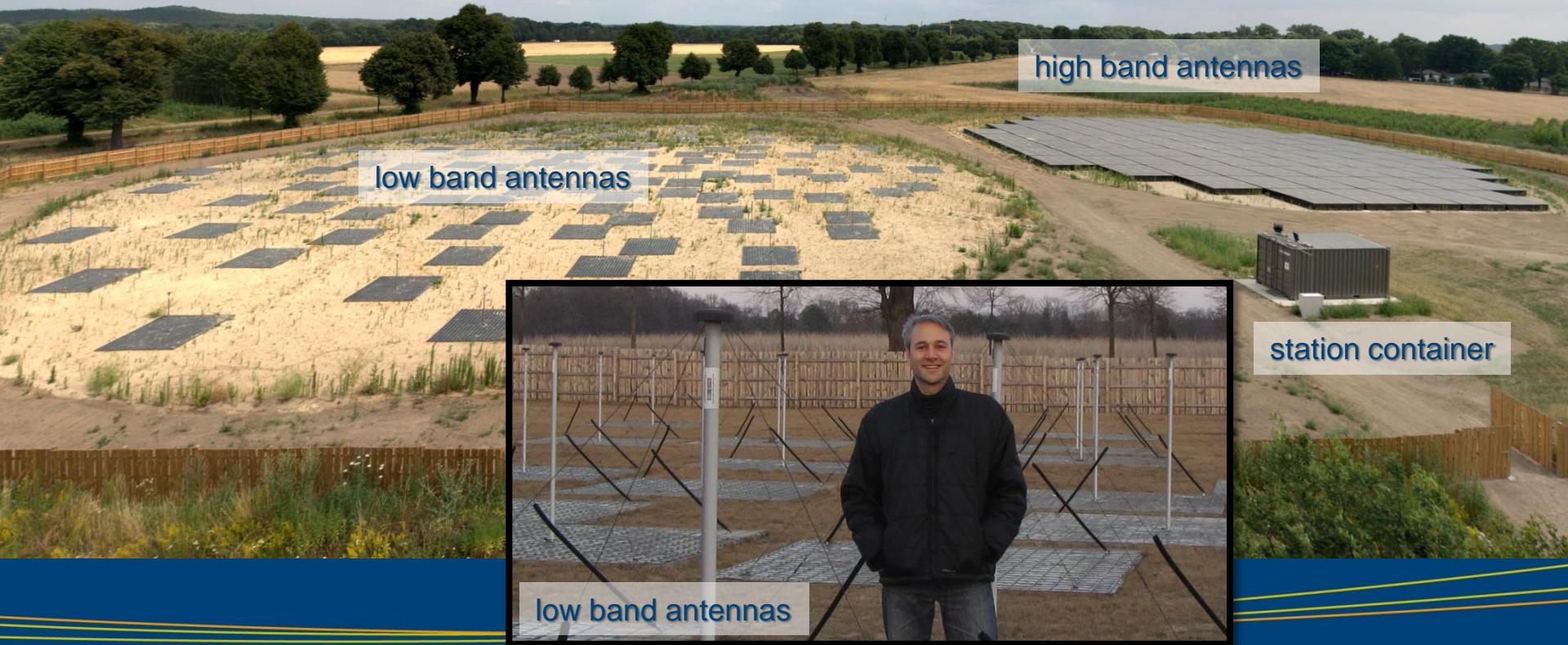
- Volume and large-scale corrections: the luminosity-rotation velocity distribution changes



Frank Breitling Solar Radio

Frank Breitling – Solar Radio Physics (G.Mann)

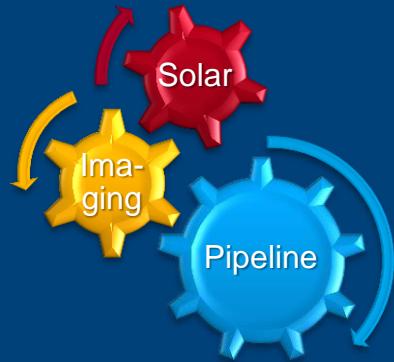
- Group studies: solar activity & space weather with radio observations
- My theoretical work: focuses on solar radio bursts
- My experimental work: observations of the Sun with LOFAR



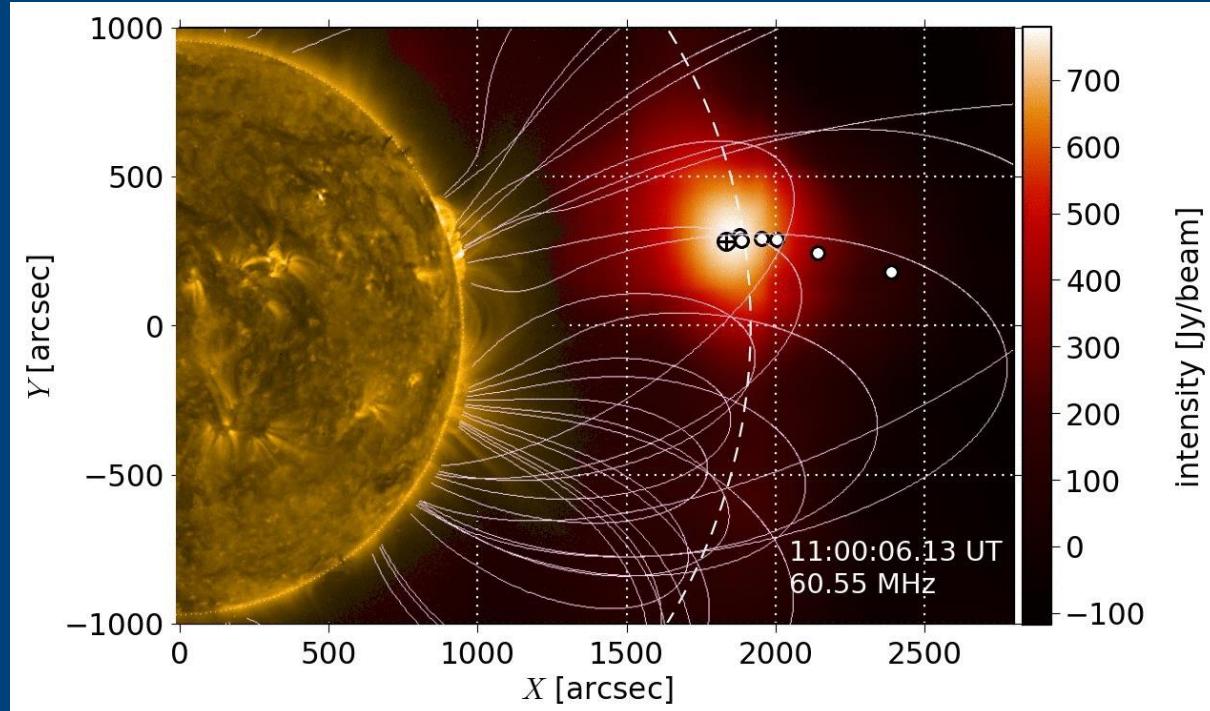
LOFAR Solar Key Science Project



developing software & analyzing data



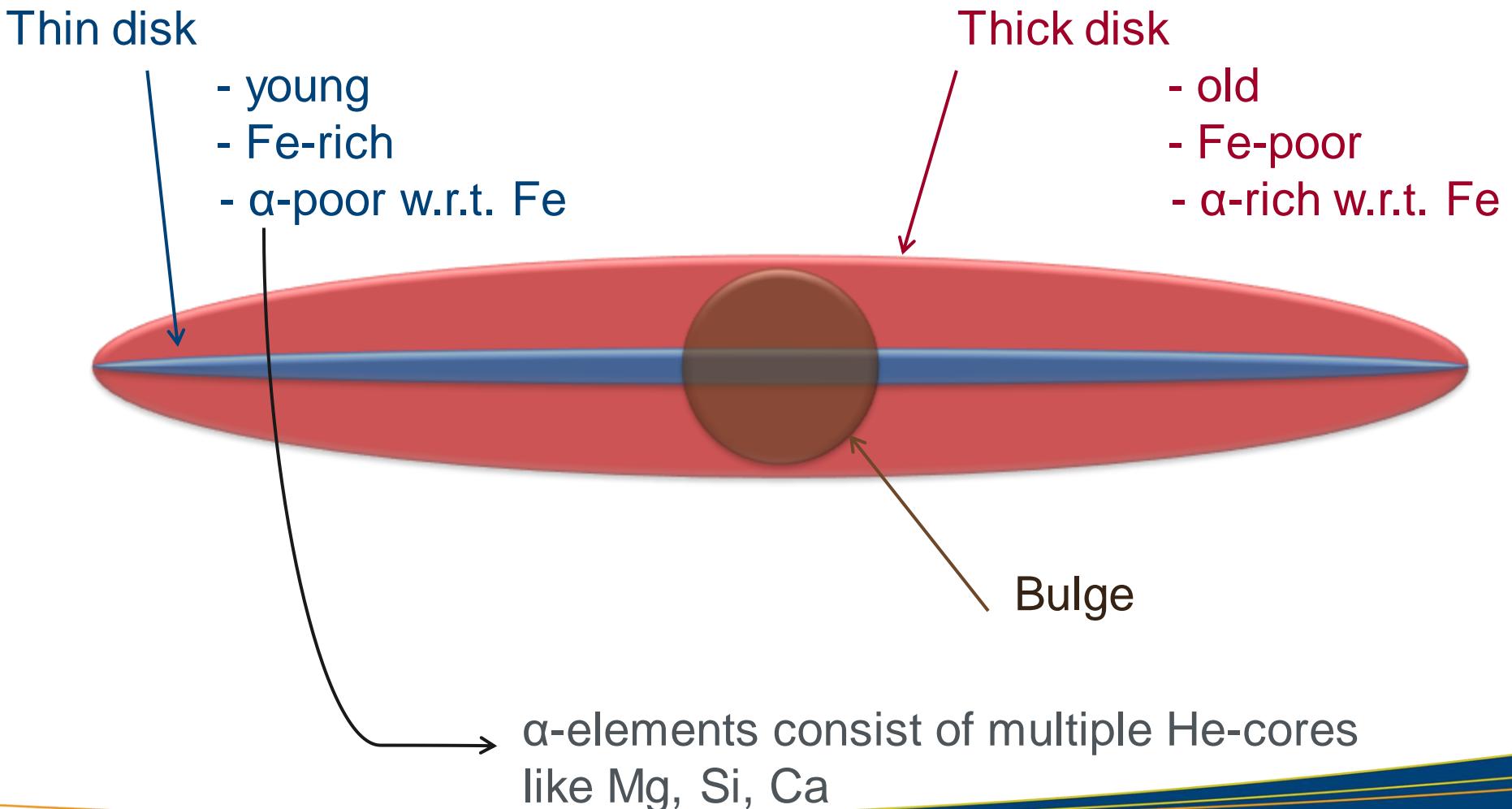
ex.: First high resolution observation of type III burst in the corona
=> information about e propagation & magnetic reconnection



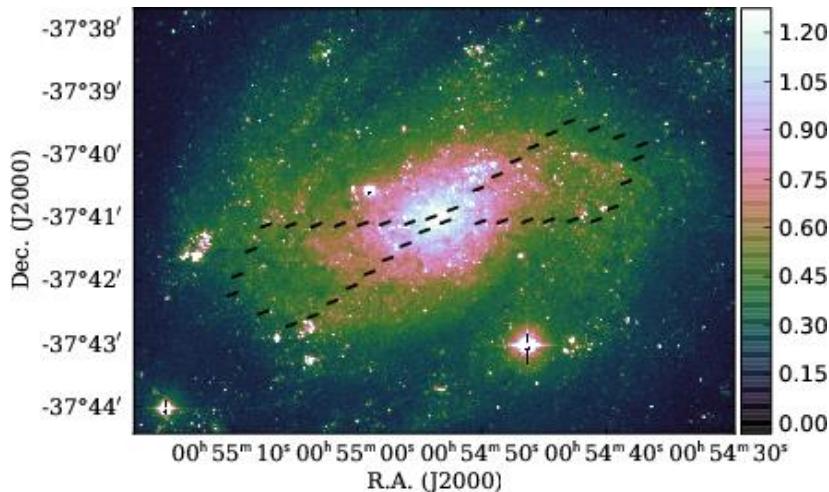
Omar Choudhury

Galaxies

The thin-thick disk structure in NGC300



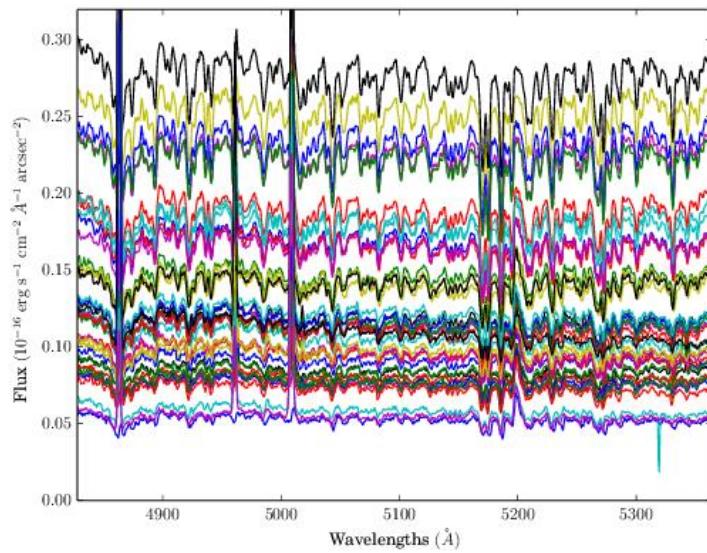
The thin-thick disk structure in NGC300



Fitting with Simple Stellar Populations (SSPs) model spectra

Each SSP is constant in age, iron-abundance and α -abundances

New differential SSPs allows fitting of both the alpha-normal thin disk and α -enhanced thick disk

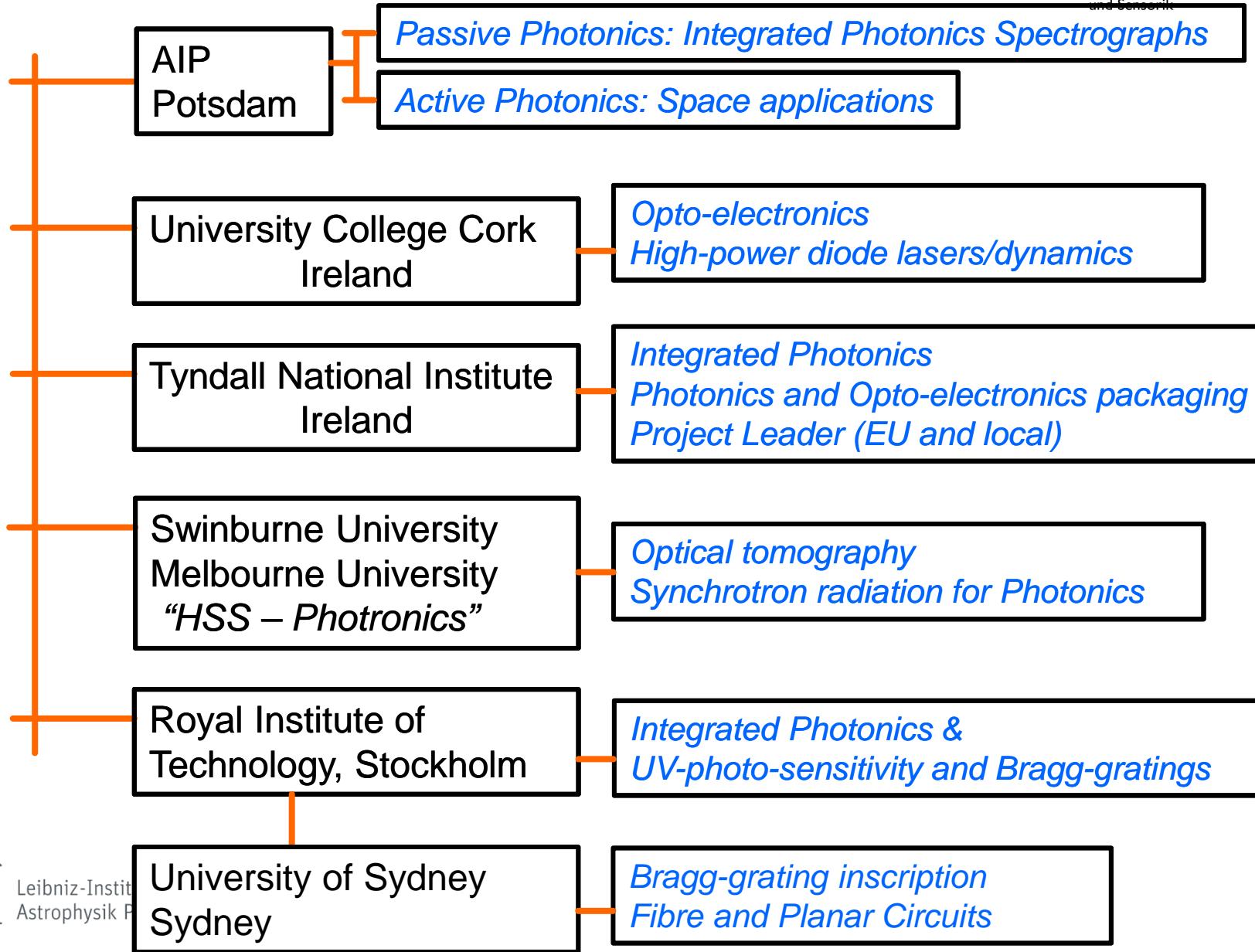


Harendra Fernando

innoFSPEC

Project: Integrated Photonic Spectrograph

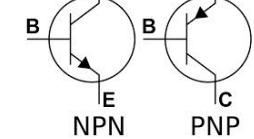
Harendra Fernando / PhD



IC & Integrated Photonics – Planar Lightwave Circuits

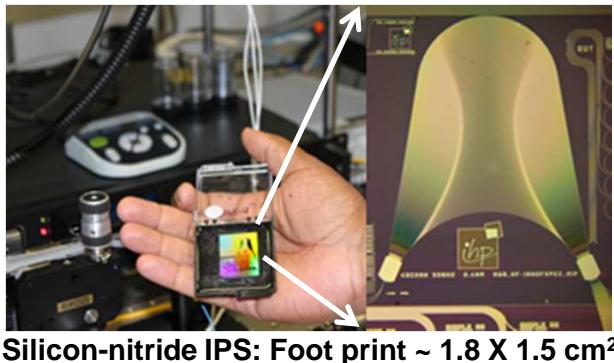


Innovative faseroptische Spektroskopie

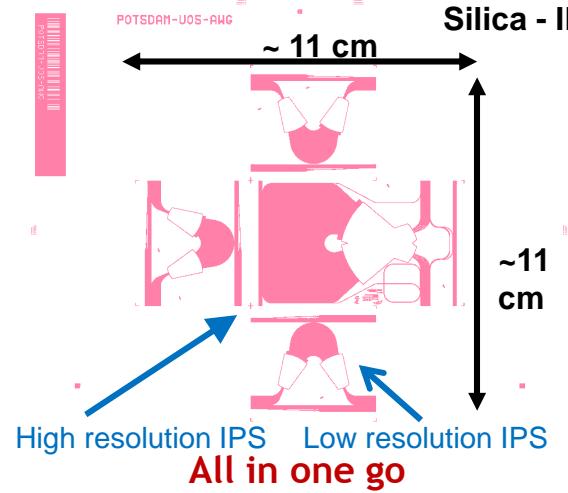


IC
Integrated Circuits

IPC - Integrated Photonics Circuits : Integrated Photonics Spectrograph (IPS)

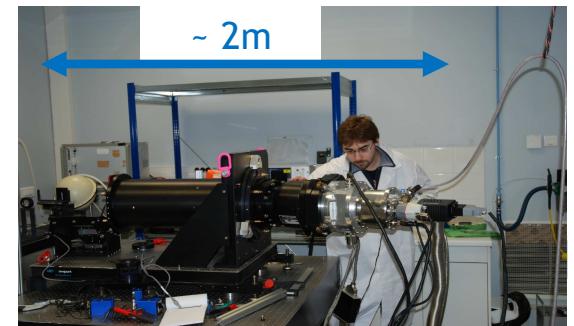


Silicon-nitride IPS: Foot print ~ 1.8 X 1.5 cm²



Why do we need
Integrated Photonics?

Bulk-optical Spectrograph



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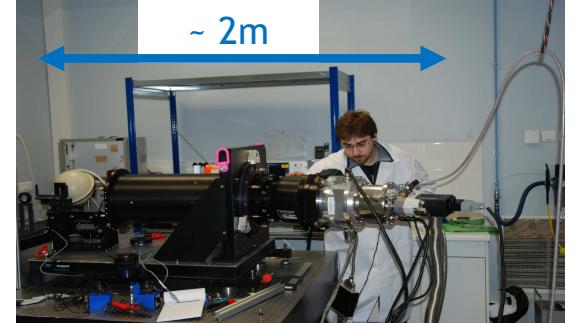


Why do we need to replace Classical Spectrograph?



- *Bulky*
- *No modularity*
- *Instability due to temperature induced flexure and misalignment*
- *Scales with Telescope aperture*
- *Costly and no good for mass-production*

Bulk-optical Spectrograph



Can we fabricate? Needs collaborators



ESA funded:
space applications

Integrated Photonics group



Southampton



FBH

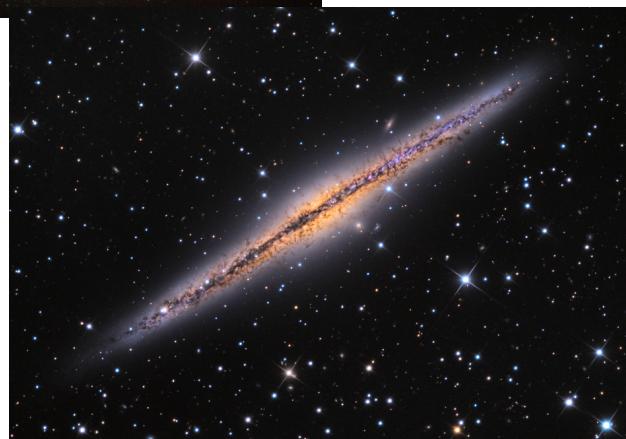


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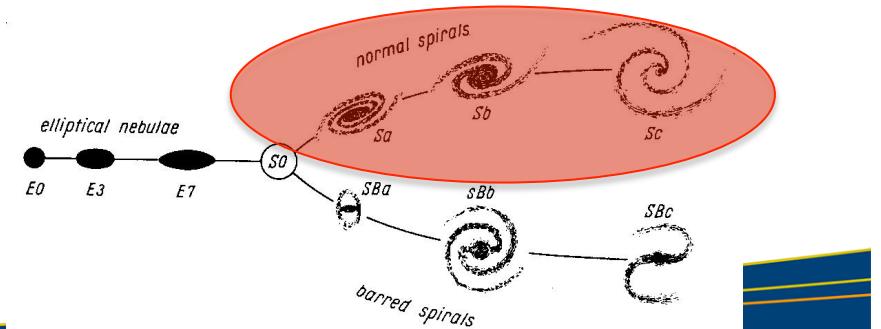
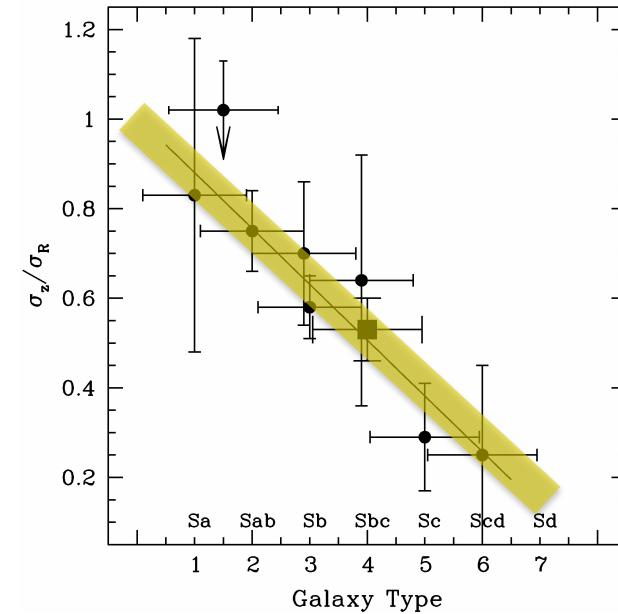
Joris Gerssen

Milky Way and the Local Volume

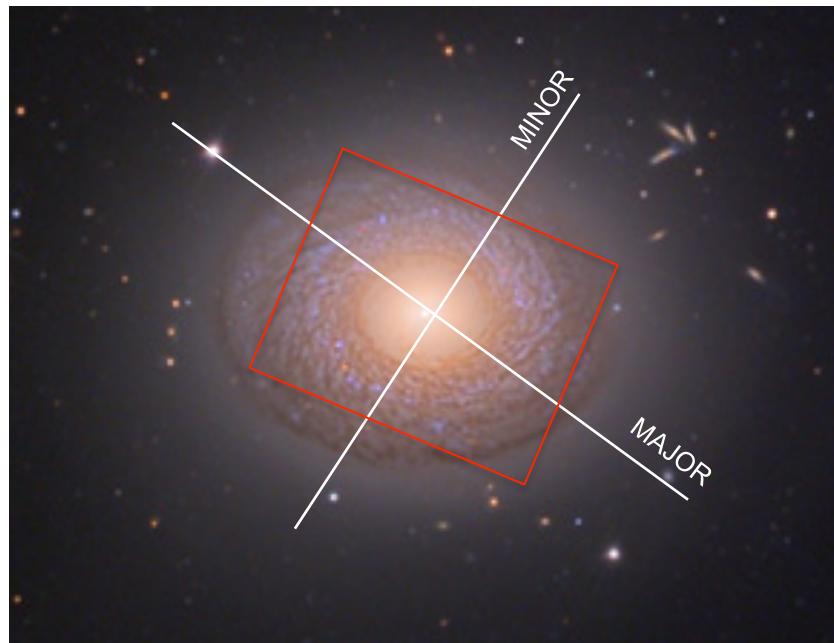
Disk galaxies: stellar kinematics



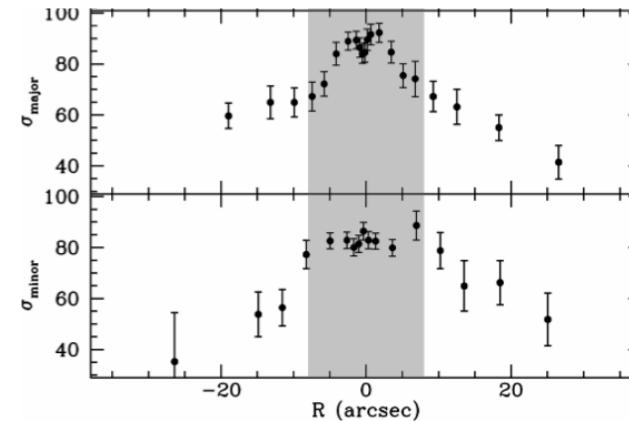
Vertical vs Radial motion



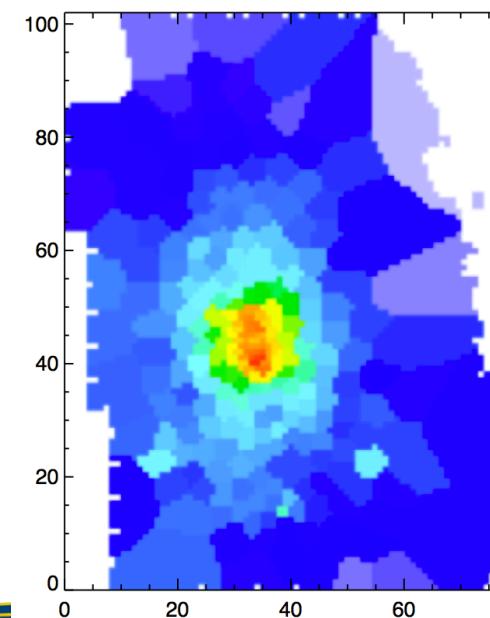
Observations of stellar kinematics



Long-slit spectroscopy



Integral-Field spectroscopy



Joris Gerssen

Domenico Giannone

innoFSPEC

innoFSPEC

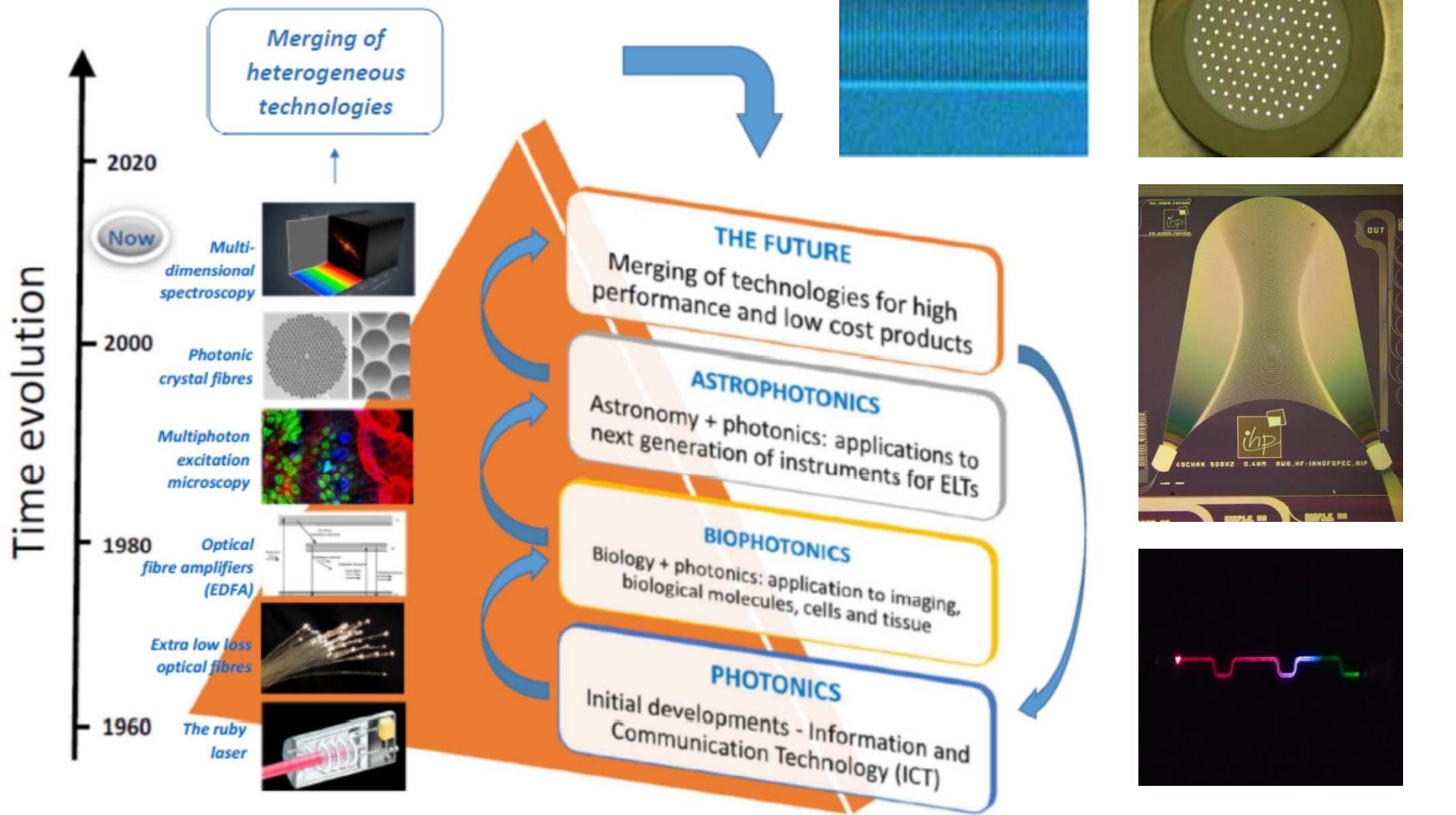
„Innovative fibre optic sensors and spectroscopy”

About me: since June 2013, I am the Centre Manager at innoFSPEC Potsdam. I have been working for nearly 15 years as researcher and science manager in four European countries (Italy, France, Great Britain and Belgium).

About innoFSPEC: since 2008, innoFSPEC Potsdam is a Research and Innovation Centre, which was created as a joint venture of the Leibniz Institute for Astrophysics Potsdam (AIP) and the Physical Chemistry group (UPPC) of the University of Potsdam (UP) to carry out multidisciplinary research in the field of fibre optic spectroscopy and sensing.

- **Multichannel Spectroscopy** (VKS, *Vielkanalspektroskopie*) - Dr. R. Haynes
Optical fibres and planar optic devices targeting applications in astronomy,
- **Innovative Fibre-Optic Sensing** (InFaSe, *Innovative Fasersensorik*) - Dr. O. Reich,
Fibre-based chemical sensing of gases, liquids and nano-/micro-particles, for the analysis of chemical or biotechnological processes,
- **Multichannel Raman Spectroscopy** (MRS) – Dr. Silvia Adelhelm
Technology transfer and assessment of the 3D Spectroscopy from Astronomy to the biomedical field (cancer diagnostic).

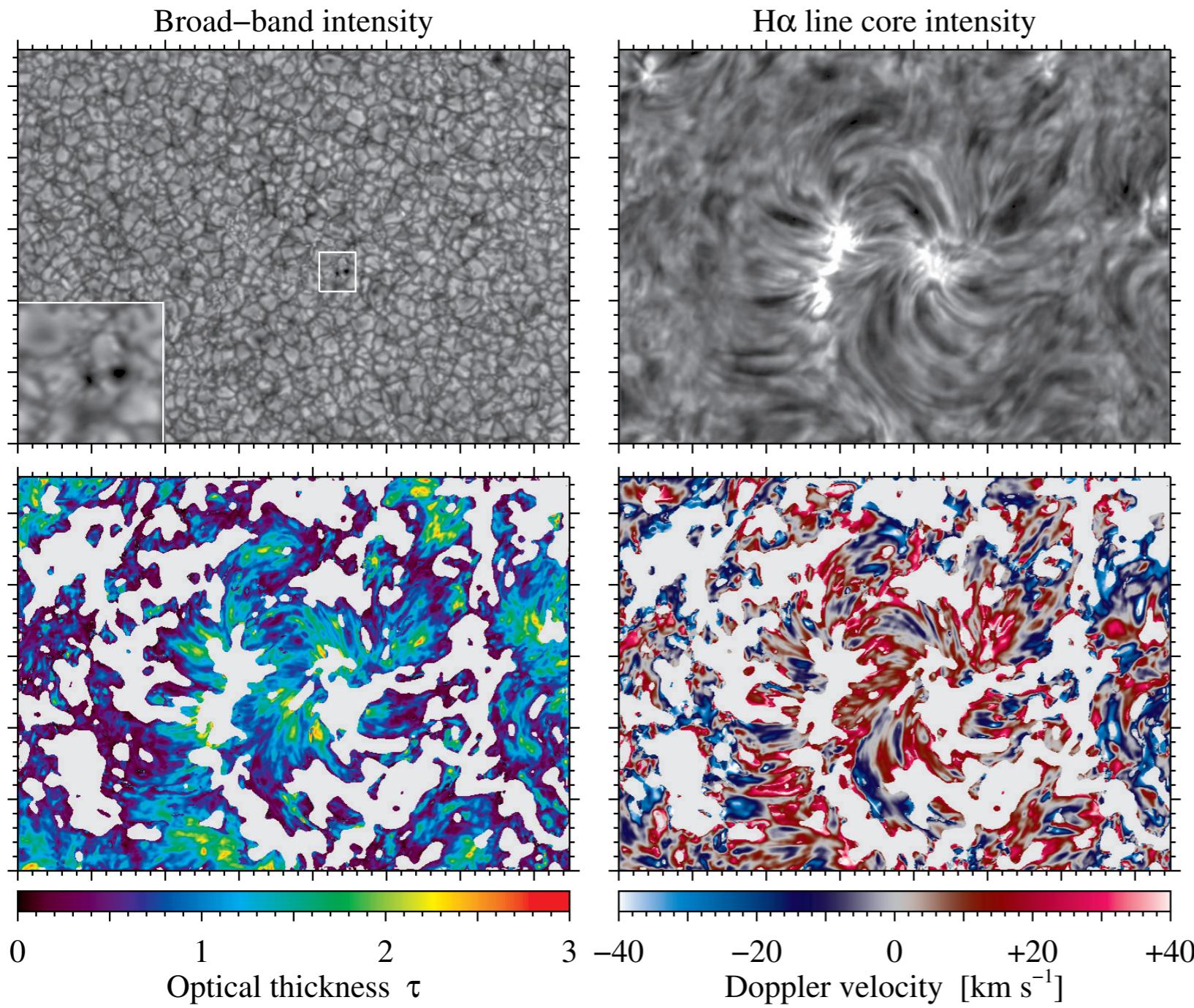
ASTROPHOTONICS



Sergio González-Manrique

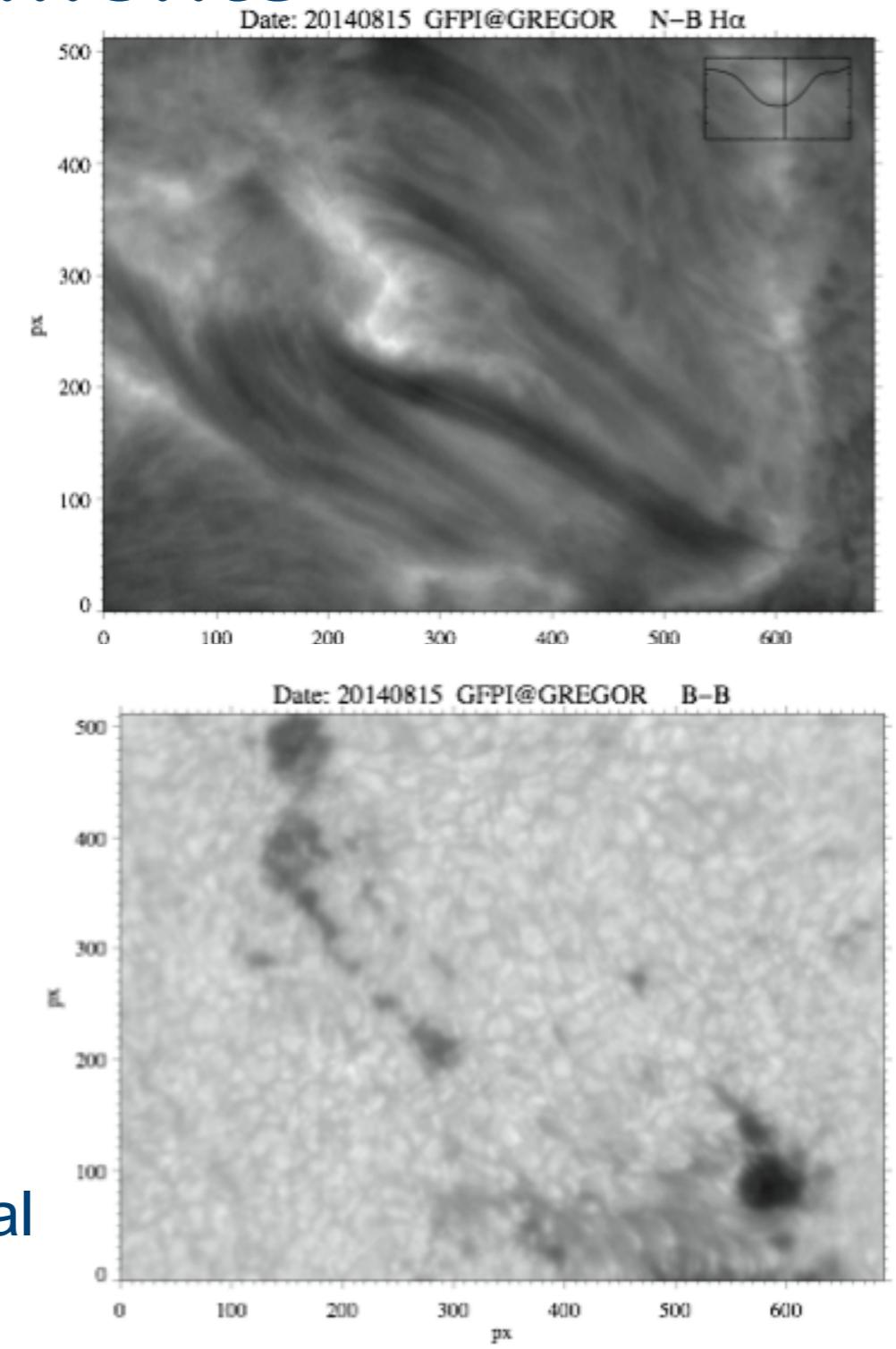
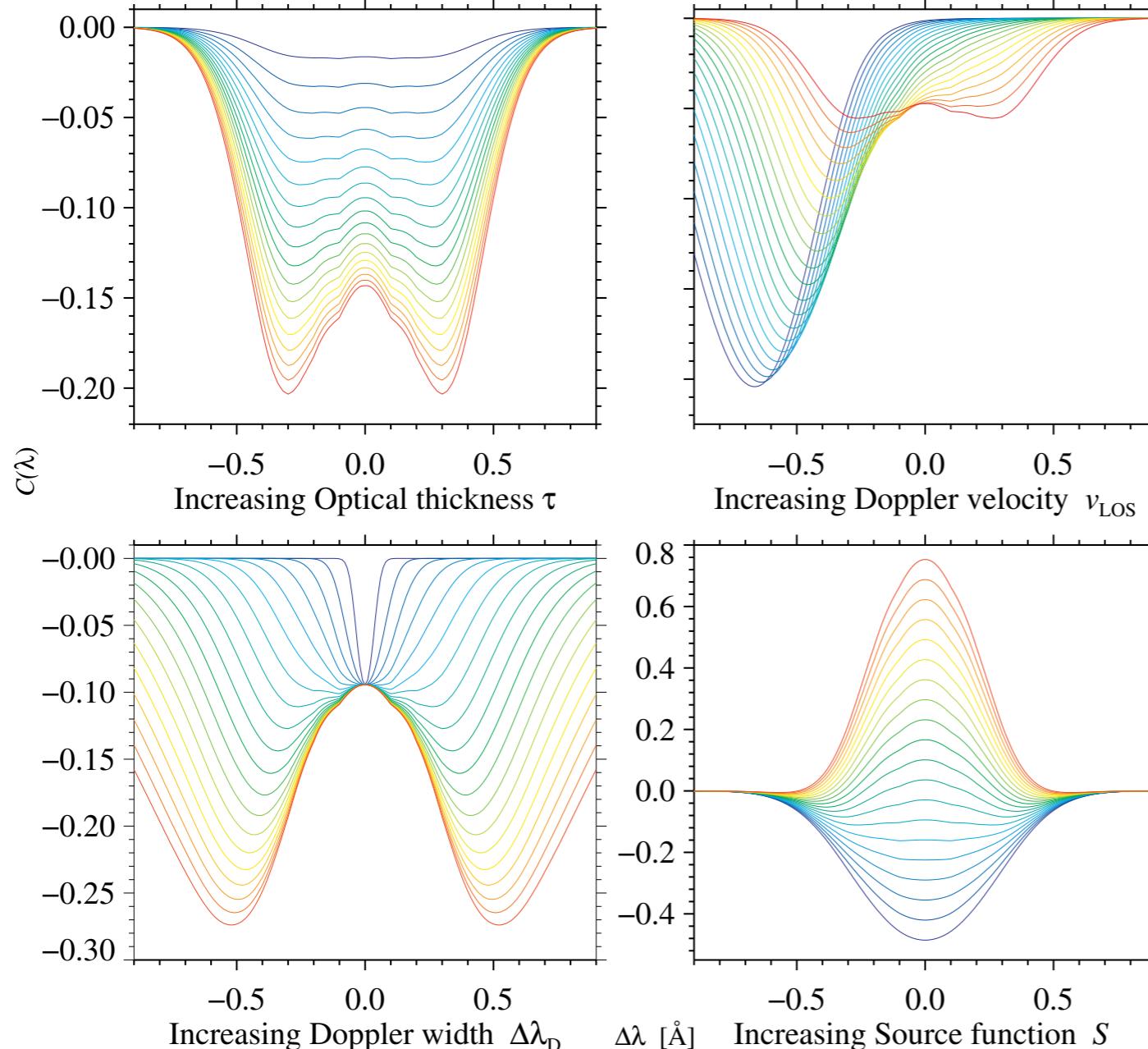
Optical Solar

High-resolution imaging spectroscopy of micro-pores in a small flux region



Observations of two micro-pores and newly emerging flux obtained with the Göttingen Fabry-Pérot Interferometer at the VTT. Cloud-Model inversions of the strong absorption line H α provide information of the cool plasma suspended by the magnetic field in the chromosphere.

The Chromospheric Hammock - Mass Balance and Stability in Filaments



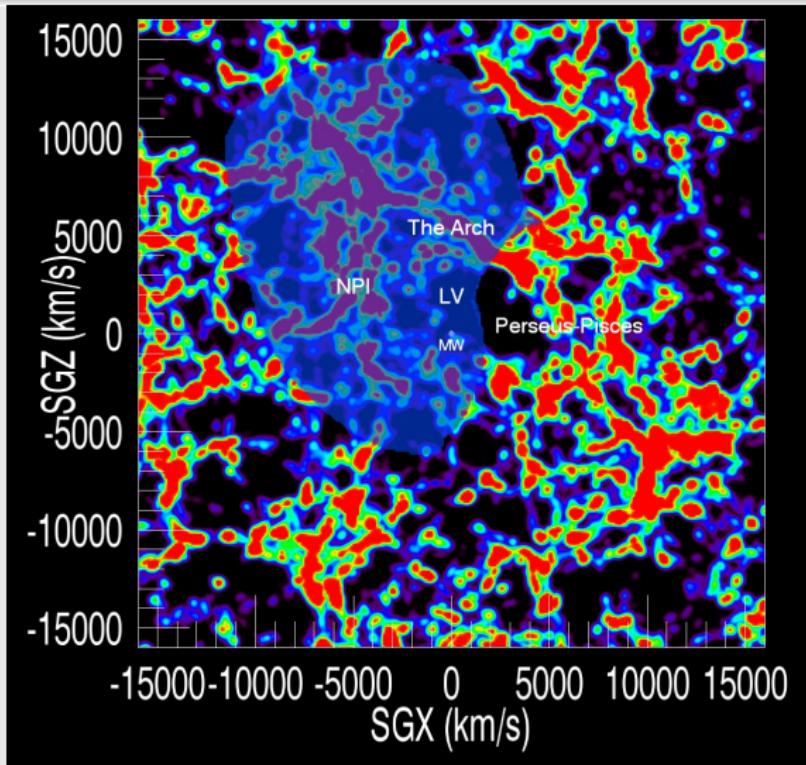
- Cloud Model Inversion Code based on Principal Component Analysis (PCA). Yanxiao Liu.
- Apply it to GREGOR Fabry-Pérot Interferometer data (GFPI).

Stefan Gottlöber

Cosmology

Initial conditions based on CosmicFlows2 observations

<http://www.clues-project.org>



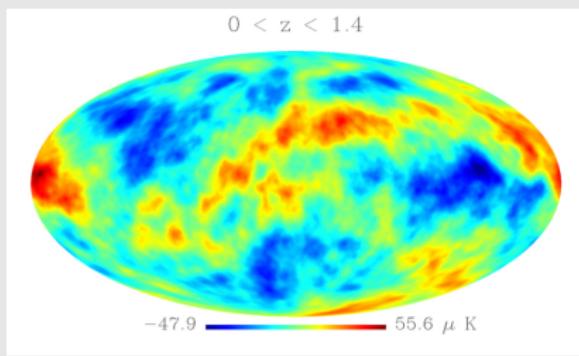
JUropa huBbLEvolumE

JUBiLEE

216 billion particles

$6000h^{-1}\text{Mpc}$ box

<http://jubilee.ft.uam.es/>



Full-sky map of the predicted secondary CMB

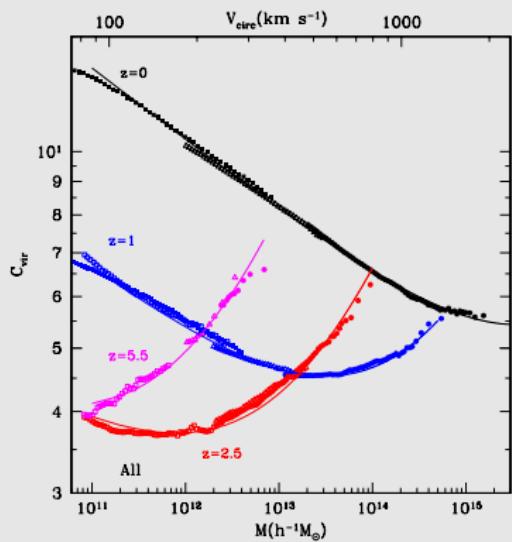
anisotropies due to the ISW effect

MultiDark project

$250h^{-1}\text{Mpc}$ to $2500h^{-1}\text{Mpc}$

2048^3 to 3840^3 particles

<http://projects.ift.uam.es/multidark/>



Concentration of dark matter halos in the BolshoiP, SMD,

MD and BigMD simulations with Planck cosmology

Thomas Granzer

Robotics

STELLA: 2 Telescopes, 2 Instruments

- SES

Echelle Spectrograph, fiber-fed, $R \approx 75000$

$\lambda\lambda$ 380-860nm, fixed format

S/N ≈ 200 for 20min on 7.5^m

- WiFSIP

Wide-field imager, 22' FoV

Strømgren, Johnson, and Sloan plus H α wide&narrow

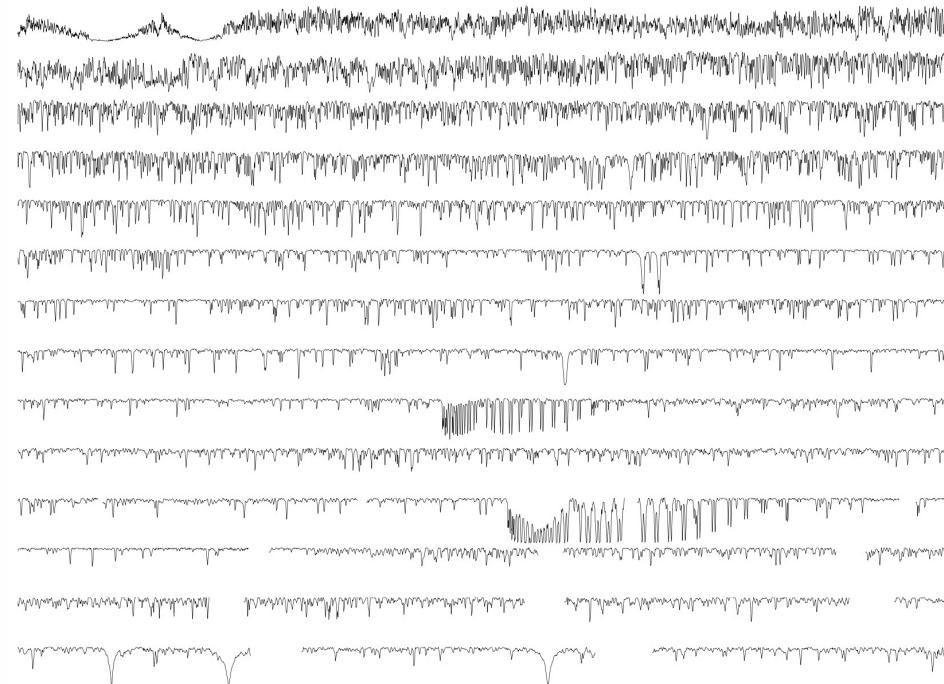
4kx4k STA chip,
0.32arcsec/pixel

AIP (= You!) holds 80% of time

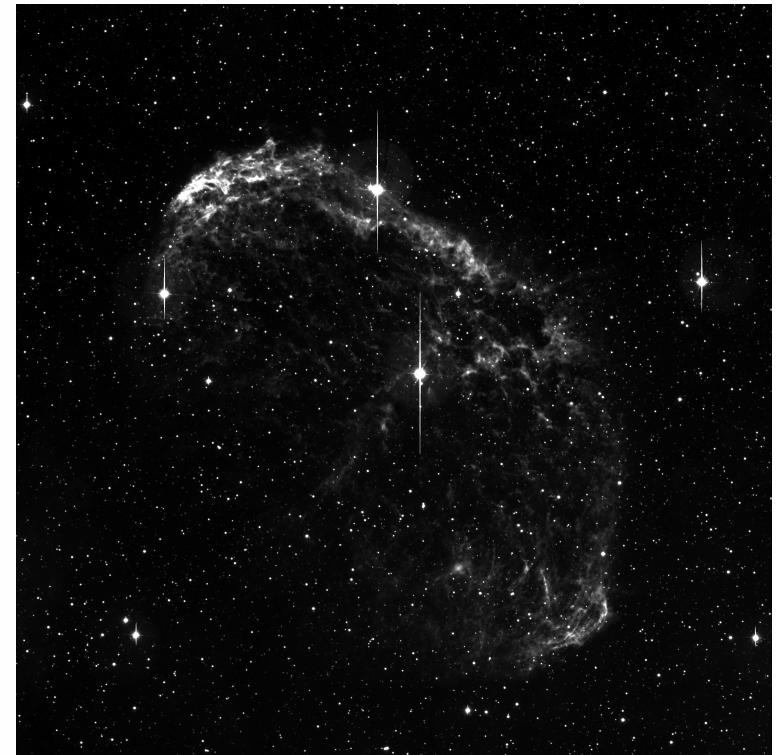


AIP

Interested?



HD 1 deep spectrum with SES



Crescent, 10min H α with WiFSIP

Upcoming institute's conference or contact
me in HH 106/#350/tgranzer@aip.de

Quan Guo

Cosmology

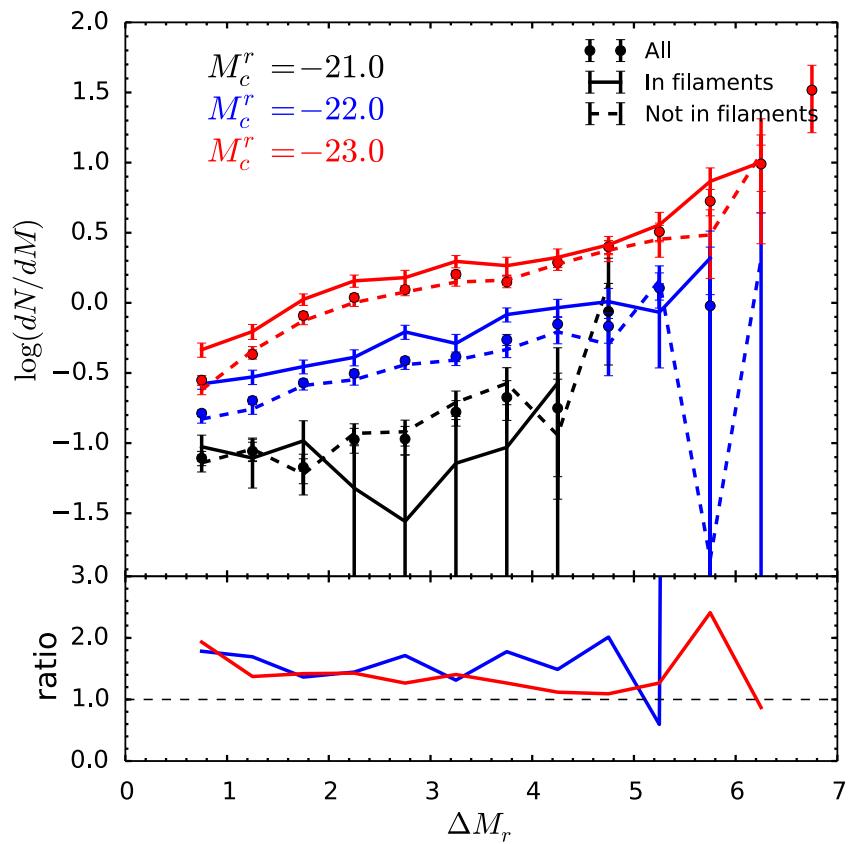
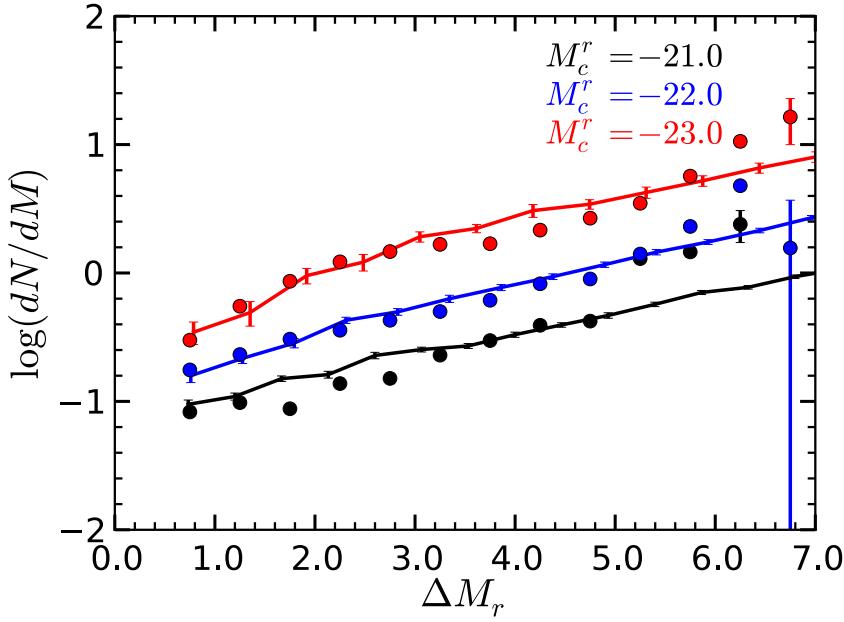
Satellite Luminosity Function (SDSS)

Quan Guo, Cosmology Group

- isolated primary galaxies

in filaments

not in filaments



Dionne Haynes

innoFSPEC / 3D-Spectroscopy

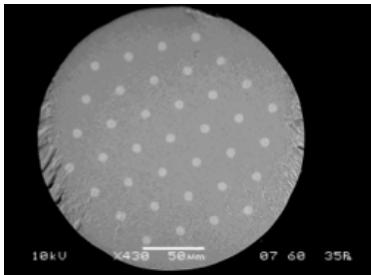


AIP

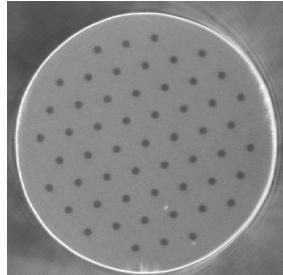
Astrophotonics

R&D optical fibre technologies – mode transitions

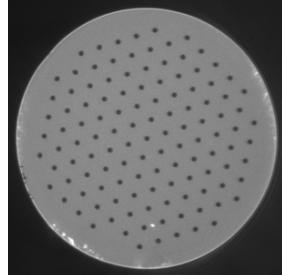
Multicore fibres – Fibre Bragg Grating inscription, amplitude and phase scrambling



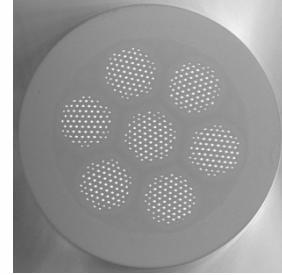
37 core



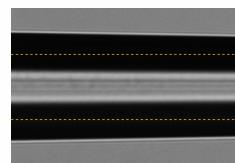
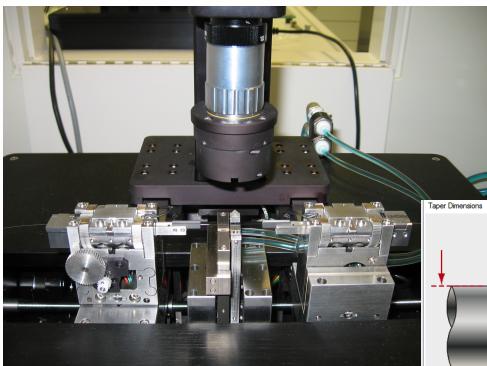
55 core



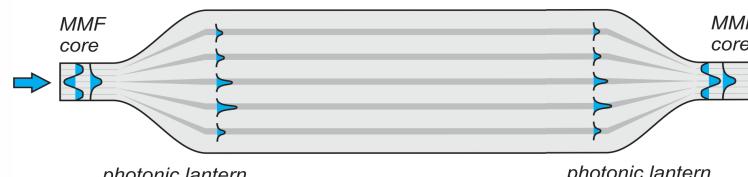
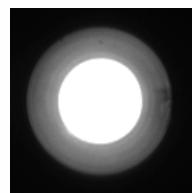
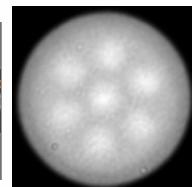
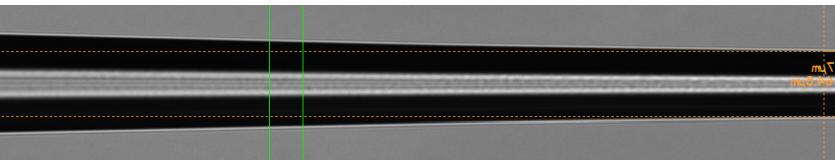
120 core



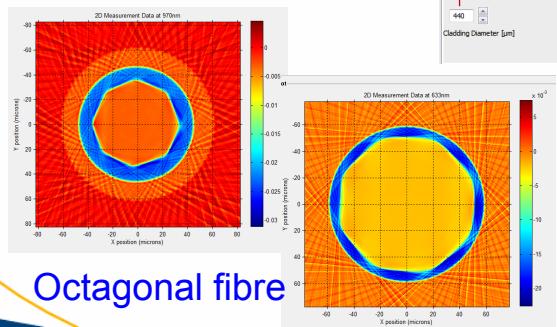
511 core



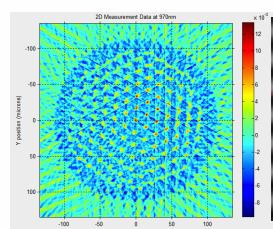
Fibre tapers – beam conversion



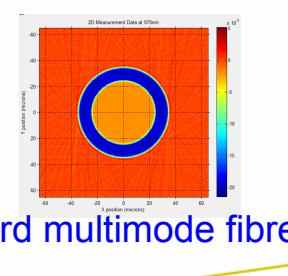
Photonic lanterns - multicore fibre tapers
Multimode to single mode conversion



Octagonal fibre



MCF 120 core



Standard multimode fibre

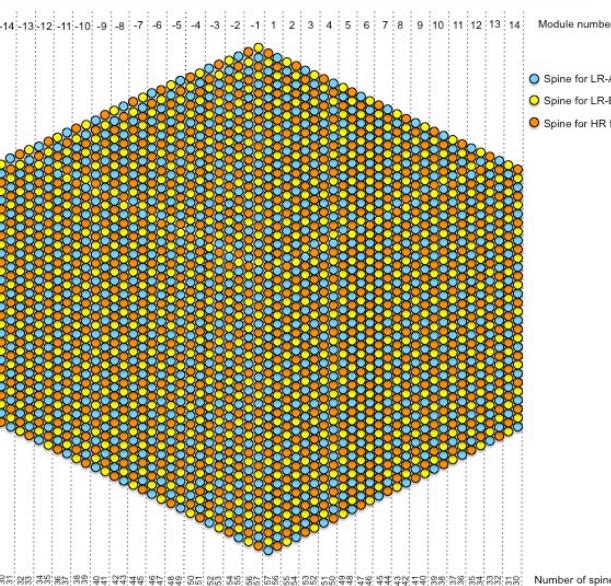
MCF 120 Photonic lantern MM core



AIP

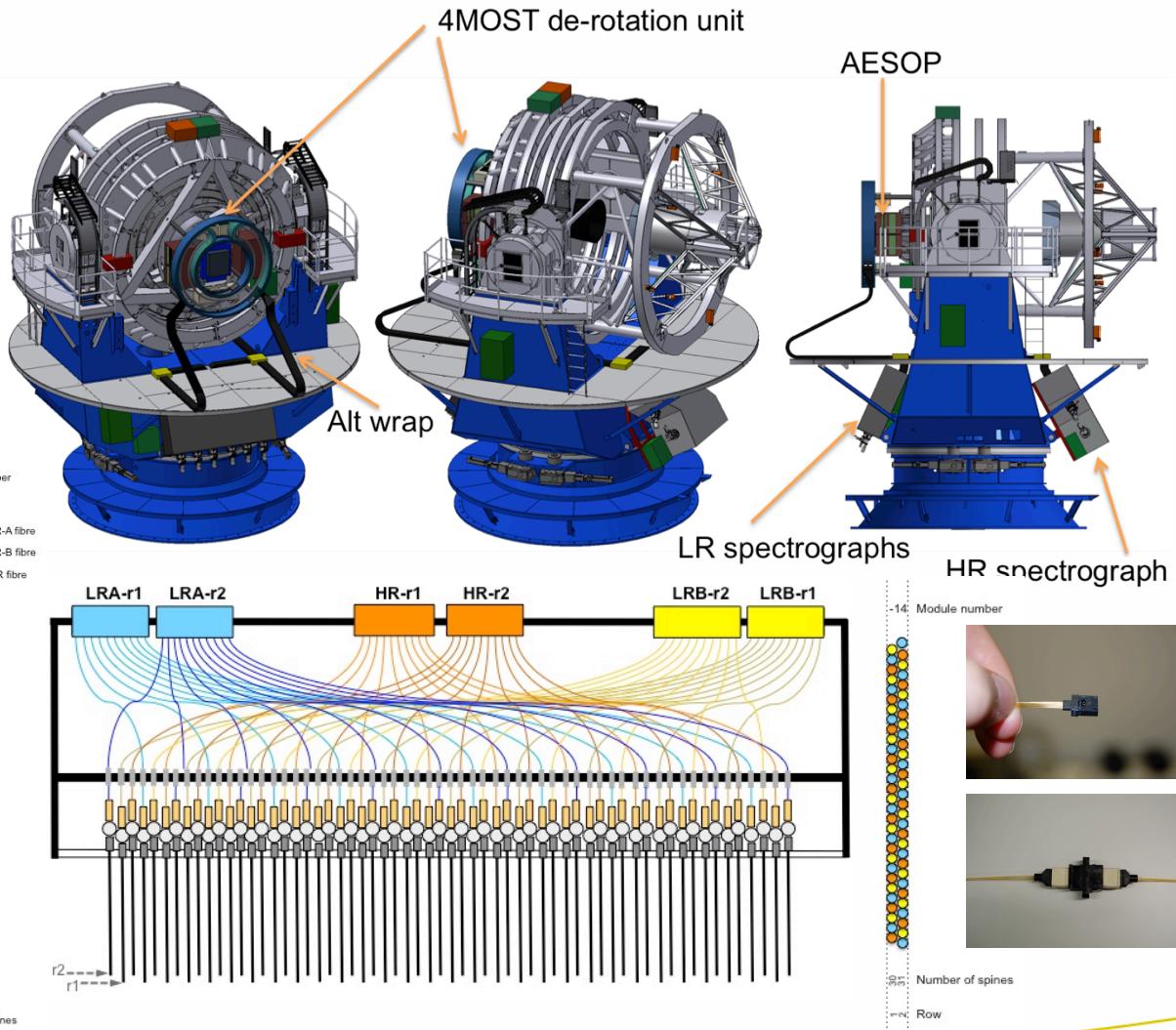
4MOST Fibre feed design
and prototype testing

VIRUS fibre bundle
acceptance testing



Instrument Scientist

Optical fibre instrumentation



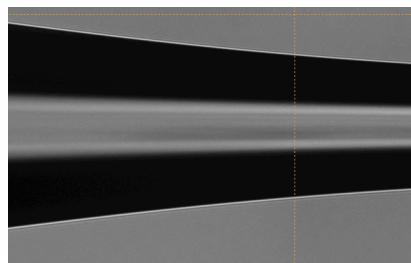
Roger Haynes

innoFSPEC ► Research Technology

Group Leader: Multichannel Spectroscopy

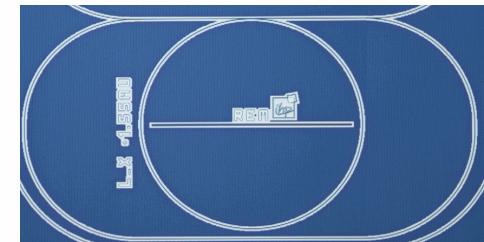


AIP



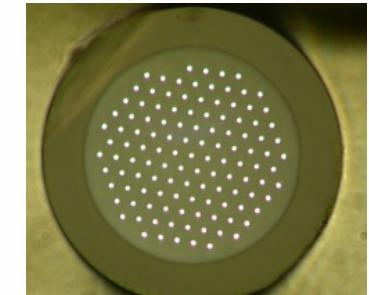
ASTROPHOTONICS

Spectrographs on a Chip

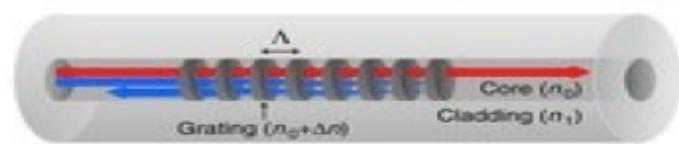


Astrocombs for λ -calibration

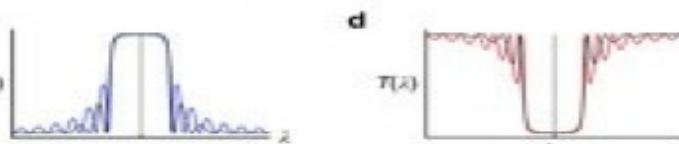
Optical transitions with fibres



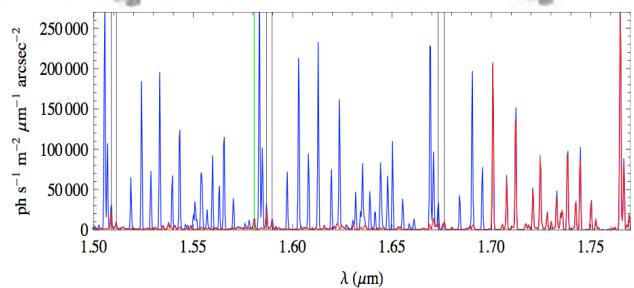
Multicore fibres



FBG based photonic filter



3D waveguide structures



Technology demonstrators

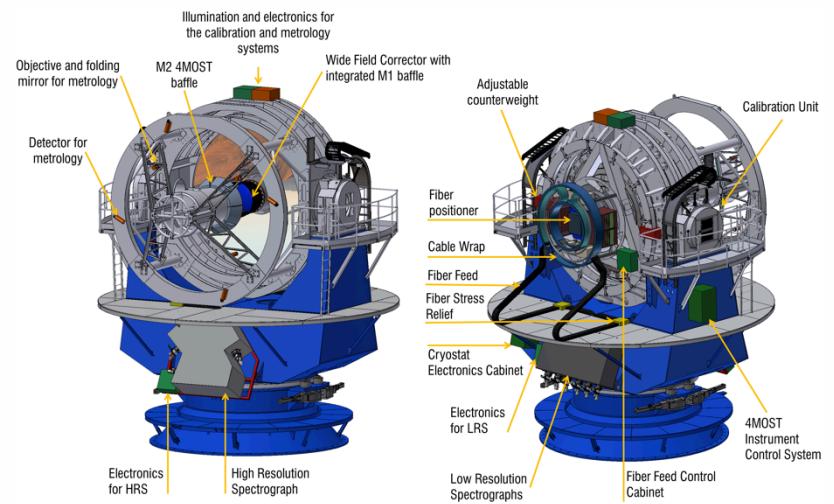


Instrument development (PRAXIS, 4MOST)



AIP

Group Leader: Research Technology



Christian Herenz

Galaxies

Edmund Christian Herenz - About Me



General

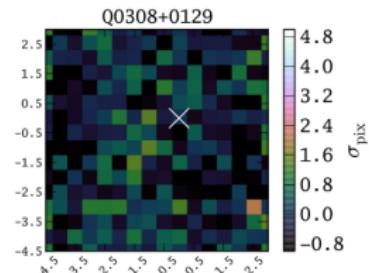
- PhD student - Lutz Wisotzki - Galaxies & Quasars Group
- Bachelor & Master Projects also at AIP
- Ly α Emission and Galaxy Formation (working title for PhD thesis)

Skills / Knowledge

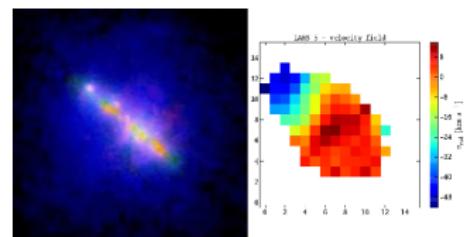
- Ly α radiation & radiative transfer
- Ly α emitters - star forming galaxies at high-z
- Circum Galactic Medium
- *Weapon of Choice:* Integral Field Spectroscopy (PMAS & MUSE)
- Python, Bash, Linux

Edmund Christian Herenz - Projects

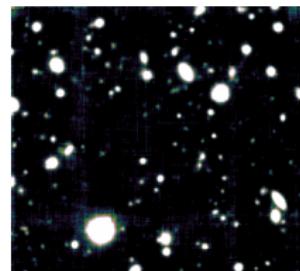
- Extended Ly α Emission around Quasars (PMAS)



- PMAS Observations of the *Lyman Alpha Reference Sample*



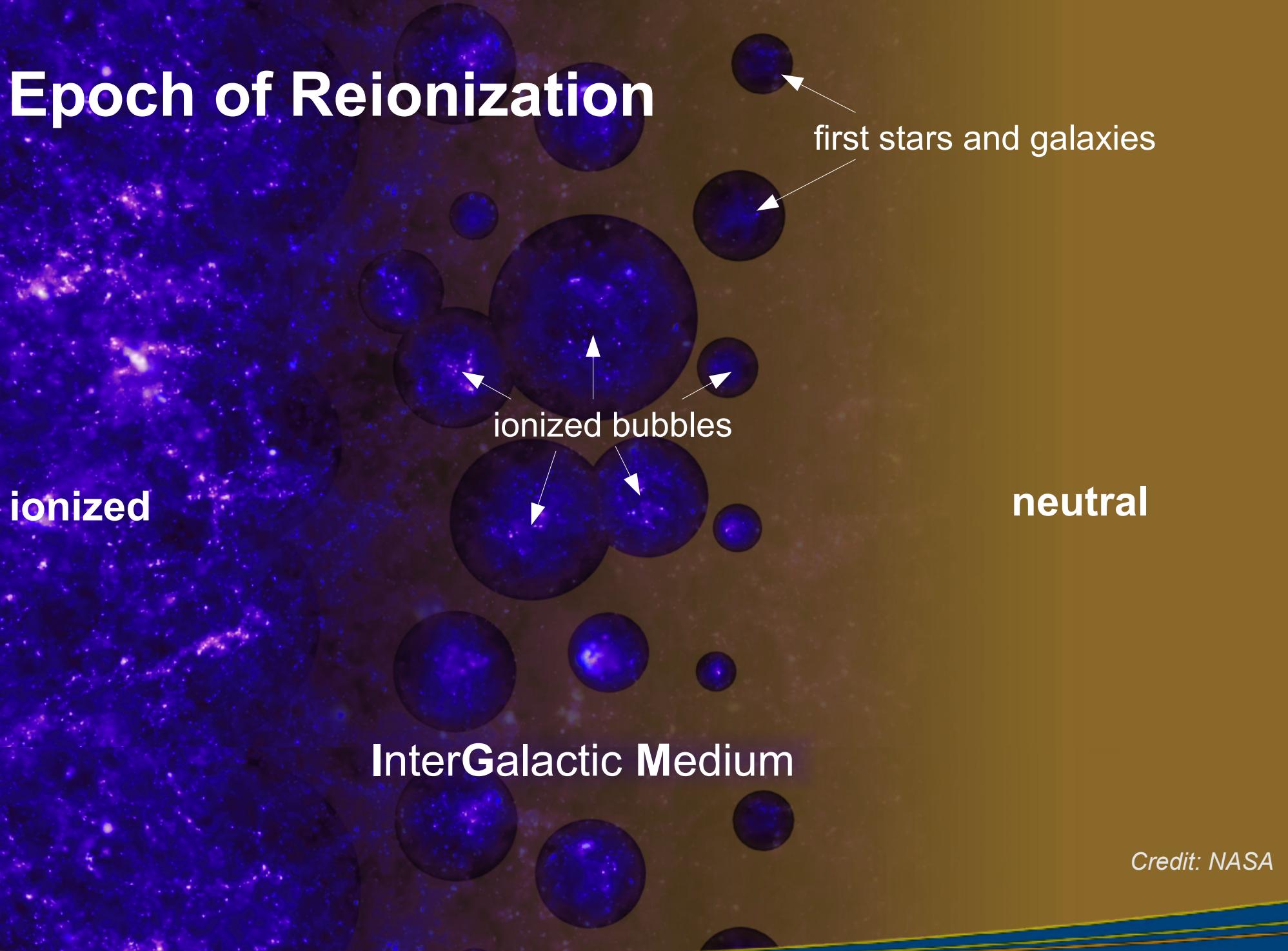
- MUSE Surveys in the Hubble (Ultra) Deep Fields → LAEs



Anne Hutter

Cosmology

Epoch of Reionization



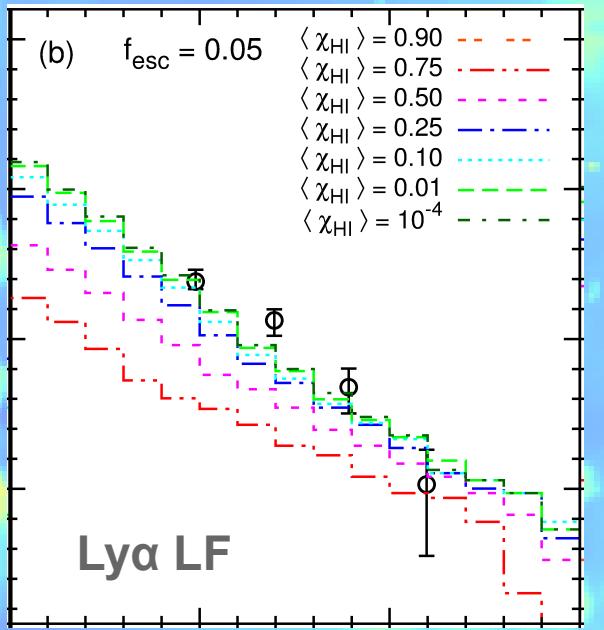
Credit: NASA

How did reionization proceed?

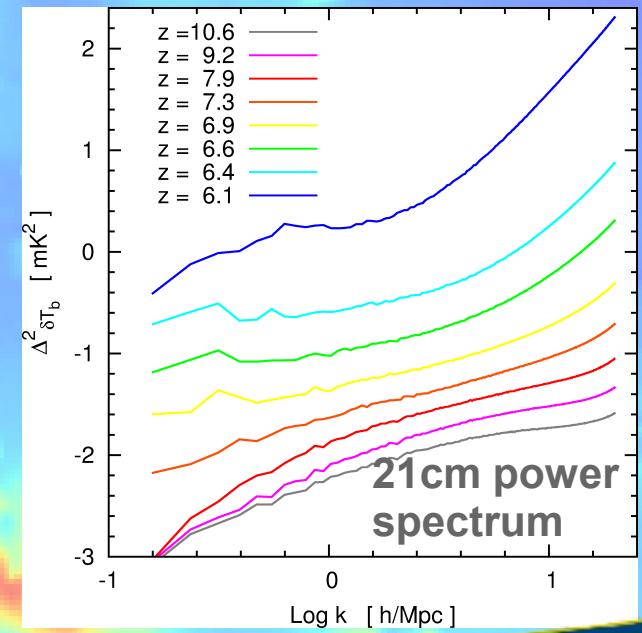
Methods:
Radiative Transfer
Simulations (pCRASH)

How can reionization be “measured”?

Lyman Alpha Emitters



21cm signal



Thomas Jahn

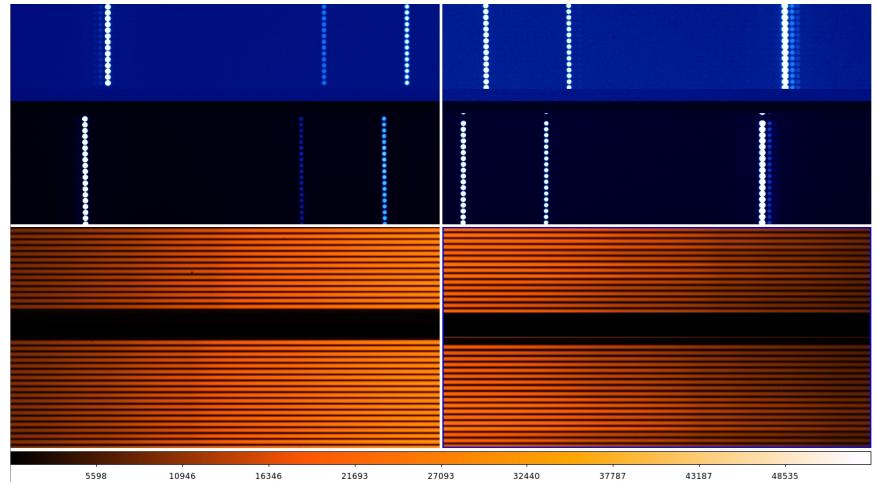
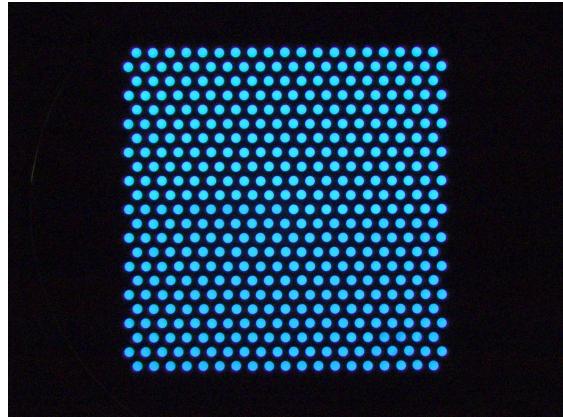
3D-Spectroscopy



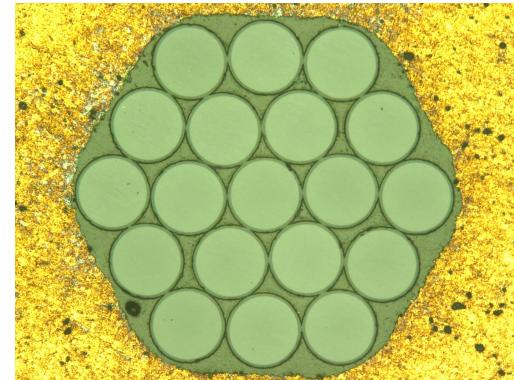
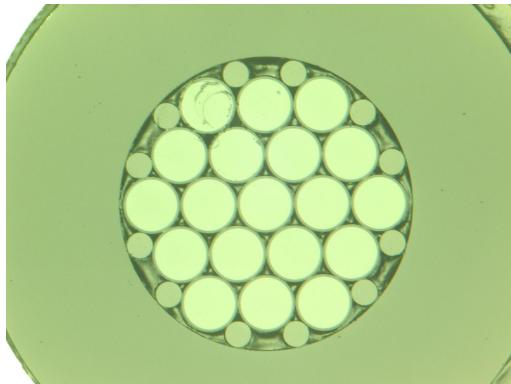
- Virus integral-field-unit assembly and testing

Acceptance tests for all IFUs:

- Optical inspection
- Astrometry of fiber positions
- Relative throughput measurements
- Focal ratio degradation evaluation
- System acceptance using a VIRUS reference spectrograph



- ERASMUS-F prototype fiber bundle evaluation



- Laser safety

- One of two Laser Safety Officers at AIP
- Design and customization of laser safety facilities if required
- I'll take care that safety facilities meet the legal regulations - paperwork



Katja Janßen

Milky Way and the Local Volume

Katja Janßen

- Born in Bremerhaven @ North Sea
- Studied Mathematics & Physics @ Göttingen
- Solar Physics Postdoc @ Florence
 - small scale magnetic fields in the solar photosphere,
reversed granulation, velocity fields, lab and software

Potsdam

Strategy Paper and Management for InnoFSPEC

astrophysical input to InnoFSPEC proposal,
Center Manager for new build center

PEPSI Management and Fiber Lab

scrambling tests

Software Development

background correction for Gaia



Software for Gaia

Background from Point Sources

- Position & Magnitude of star, Line Spread Function & Instrument Response
→ Light Distribution on CCD
- Target Window → Light in Readout Window, Target sampling
- Truncation → Window shape before readout
- Atmospheric parameters → full Template
- Radial / Rotational Velocity → Spectral shift and line broadening

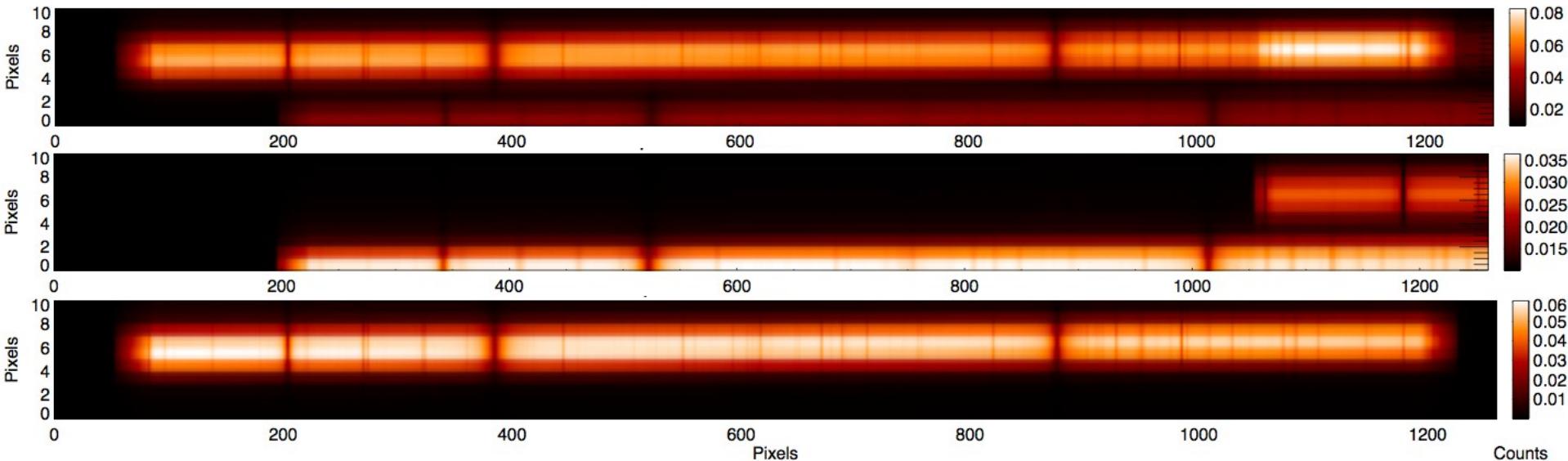
Simulation of Gaia RVS

Diffuse Background & Straylight

Empty *Virtual Objects* θ Reject invalid samples → fold with rotation period

Software for Gaia

Background from Point Sources



Diffuse Background & Straylight

Empty *Virtual Objects* \ominus Reject invalid samples \rightarrow fold with rotation period

Andreas Kelz

3D-Spectroscopy

Education & experience (from previous life)



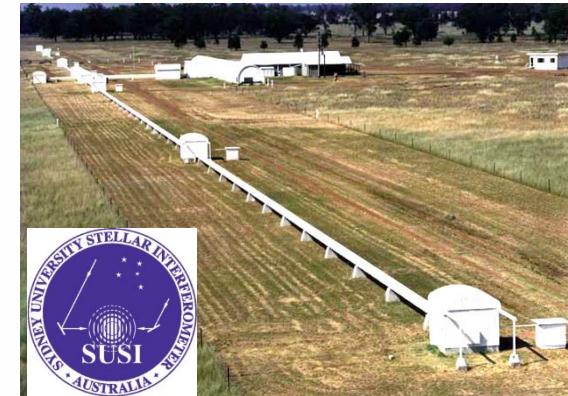
TECHNISCHE
UNIVERSITÄT
DARMSTADT



Dipl-Phys. „Laminar Wing“



Astro-Praxis
(LSW, Sydney Obs.)

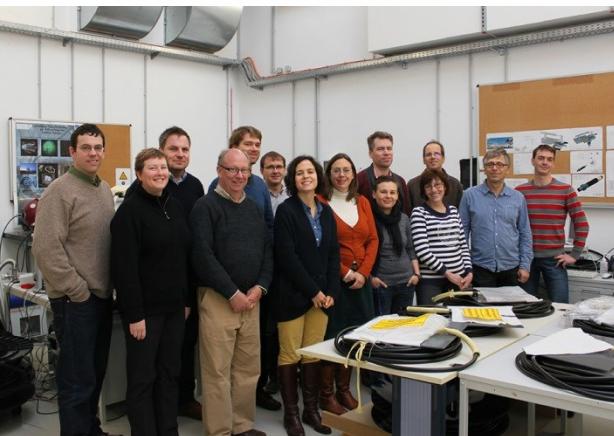
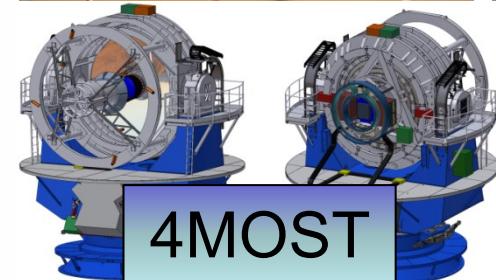
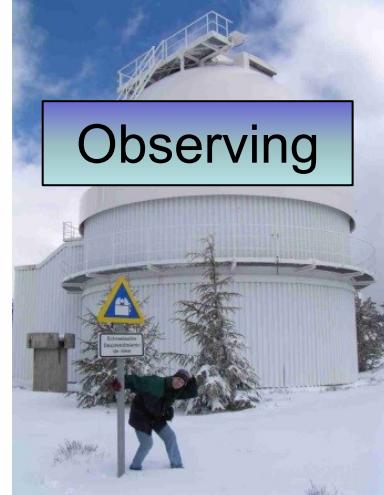
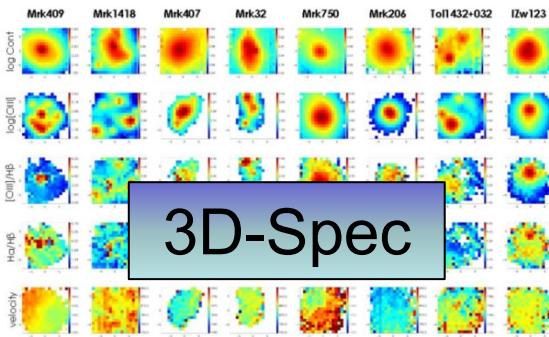


PhD: Fundamental
stellar parameters

Andreas Kelz

3D- and Multi-Object Spectroscopy team & projects

Observing



PR