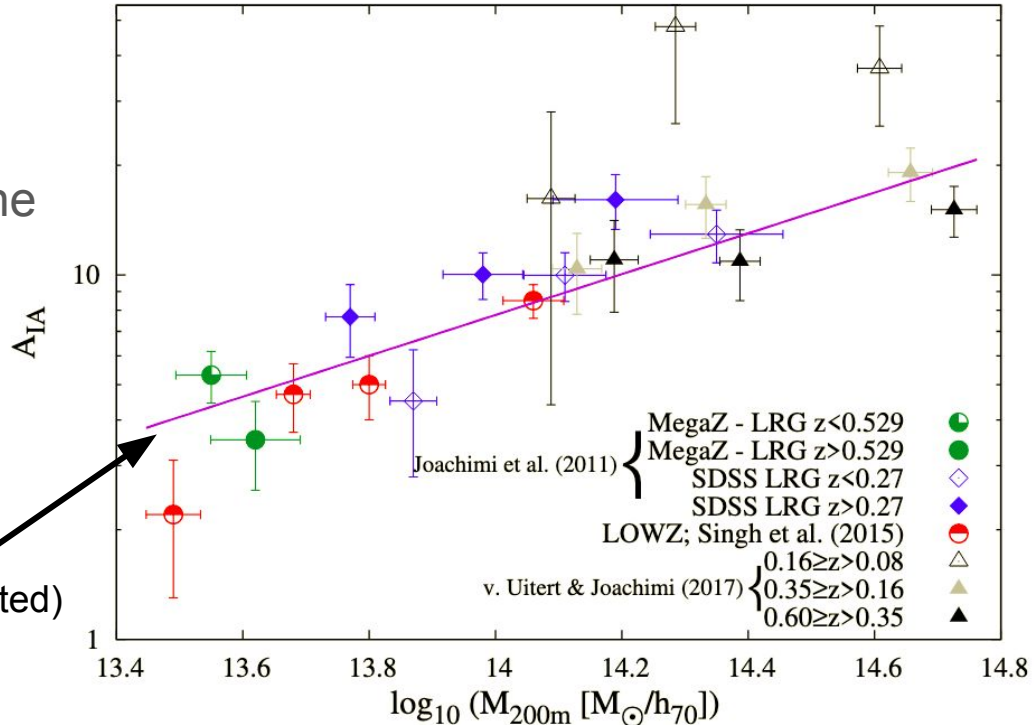
echolA Participants

Everyone, please add one slide about yourself following the template on Slide 2.
Presentation time will be 60s.

Benjamin Joachimi (University College London)

- Measured IA in SDSS galaxy & cluster samples
- Measured IA in dark matter-only simulations
- Built semi-analytic IA models in the Millennium Simulation
- Has a history of organising IA workshops

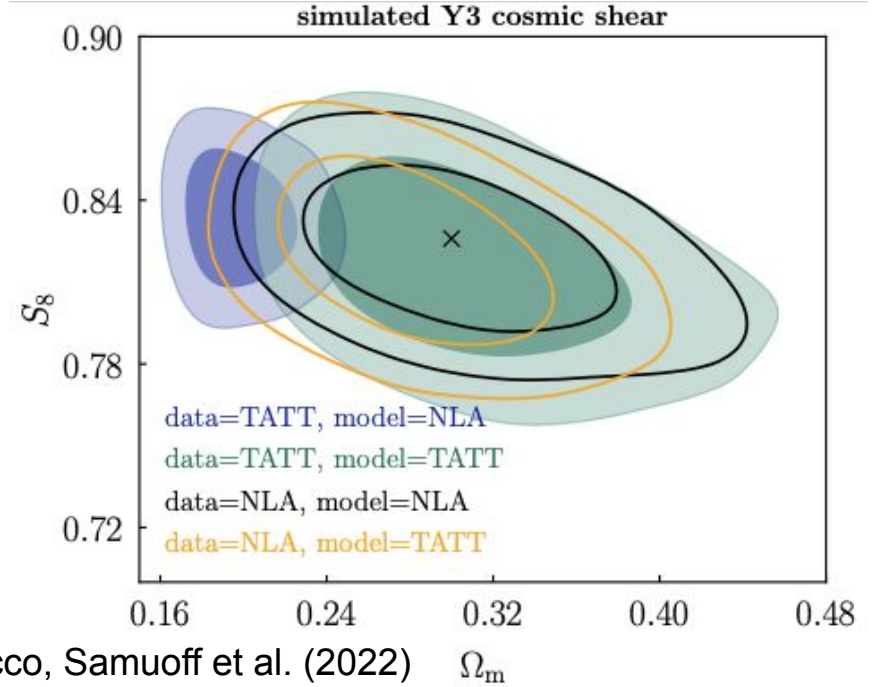
Piras et al. (2018)



Simulation prediction (only amplitude fitted)

Jonathan Blazek (Northeastern University)

- Developing a range of modeling, measurement, and simulation methods for IA
- “Tidal alignment and tidal torquing (TATT)” model, including implementation in FAST-PT, CosmoSIS, and CCL, and DES analysis
- Northeastern group very active in IA
- Also have a history of organizing IA workshops (with Benjamin!)



DES Y3: Secco, Samuoff et al. (2022)

Bjoern Malte Schaefer (Heidelberg University)

Analytical models for IAs based on tidal interaction

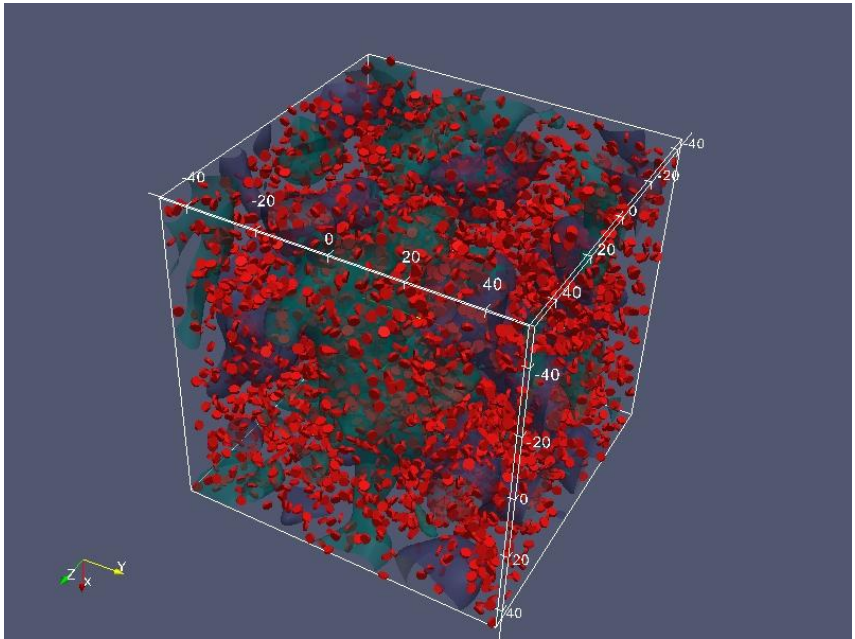
Statistical properties of IA correlations (Gaussian and beyond)

Separation of IA and lensing

IA cross correlations

Non-standard alignment models

IAs as tools rather than nuisances

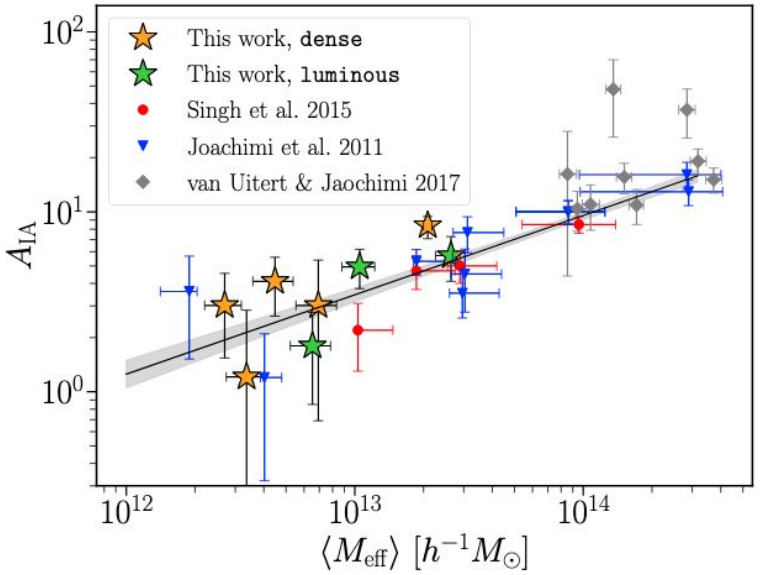


Henk Hoekstra (Leiden University)

Interested in measuring IA signals to improve corrections in cosmic shear studies.

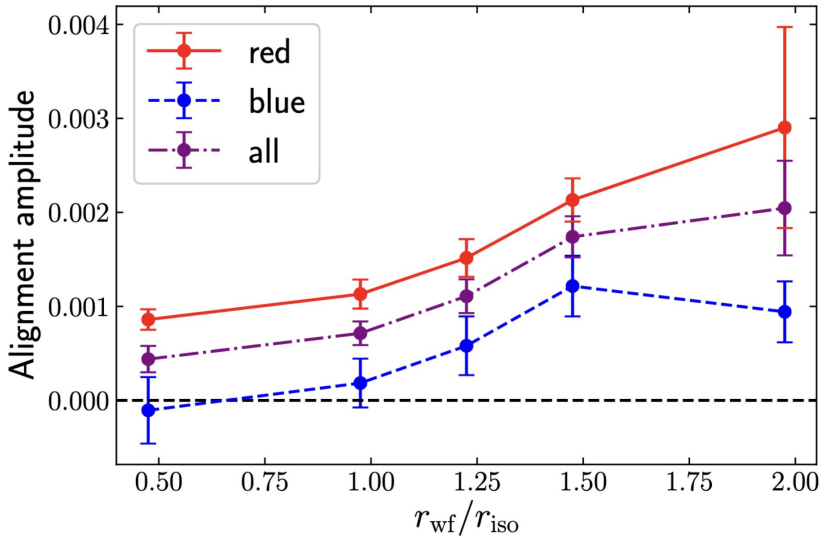
Helped to measure this in clusters (Sifon et al. 2015) and groups (Georgiou et al. 2019)

Recently measurements with Maria Cristina Fortuna on halo model and KiDS measurements for LRGs (see figure)



Christos Georgiou (Utrecht University)

- Shape measurements of bright GAMA galaxies using DEIMOS.
- Measured alignment signal in different broad-band filters on KiDS.
- Measured alignment signal in GAMA groups with varying radial weight on the shape measurement method.
- Probed galaxy-halo alignment via the anisotropic weak lensing measurement.



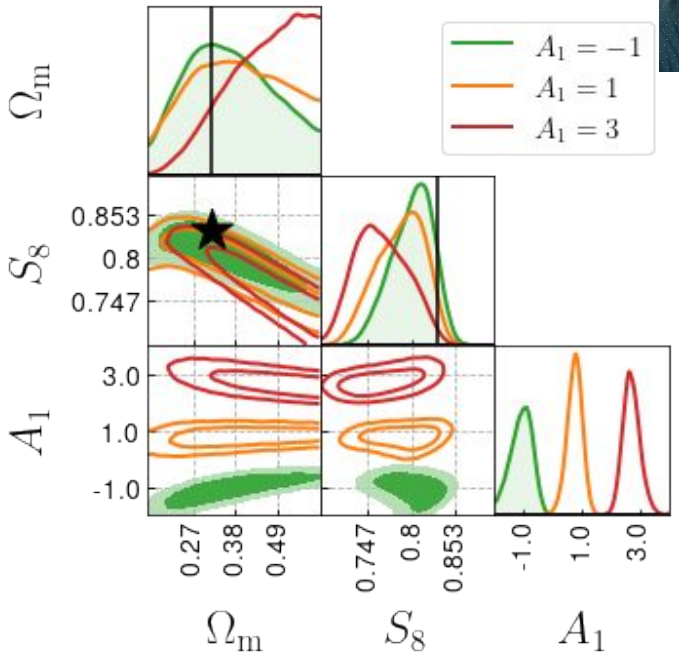
Georgiou et al. 2019

Silvan Fischbacher (ETH Zurich)

PhD student at the cosmology research group of Alexandre Refregier

Coupling between IA and redshift errors

Requirement analysis for redshift calibration depending on different IA models



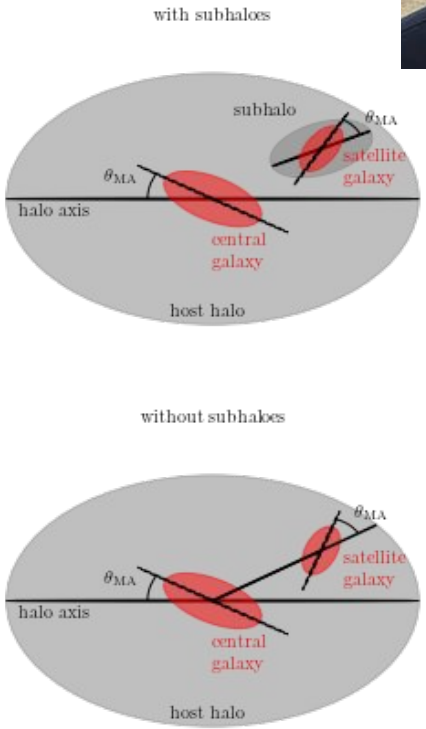
The strength of biases due to redshift errors depends strongly on the intrinsic alignment of galaxies.

Nick Van Alfen (Northeastern University)

Ph.D. Student working with Jonathan Blazek

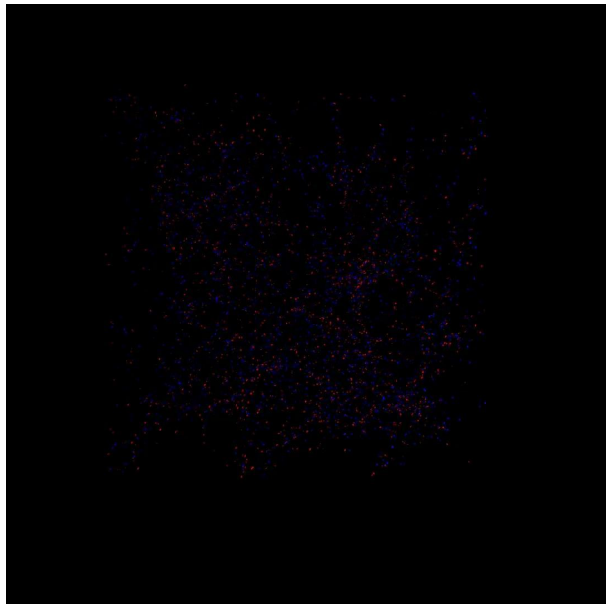
Working on simulating IA using information from dark matter halos

Figuring out how to extract a reliable major axis from noisy, downsampled particle data for halos



Kai Hoffmann (University of Zurich -> Barcelona)

- postdoc, interested in understanding IA using cosmological simulations
- IA related work:
  - Implementation of IA in large galaxy catalogs from dm-only sims using “semi-analytic” IA model
  - Study of galaxy shapes in COSMOS observations
  - measuring dm halo shapes in simulations
  - developing codes for measuring 2pt IA statistics
  - comparing 2pt IA statistics from “semi-analytic” IA sims with hydro-sims and analytic IA models



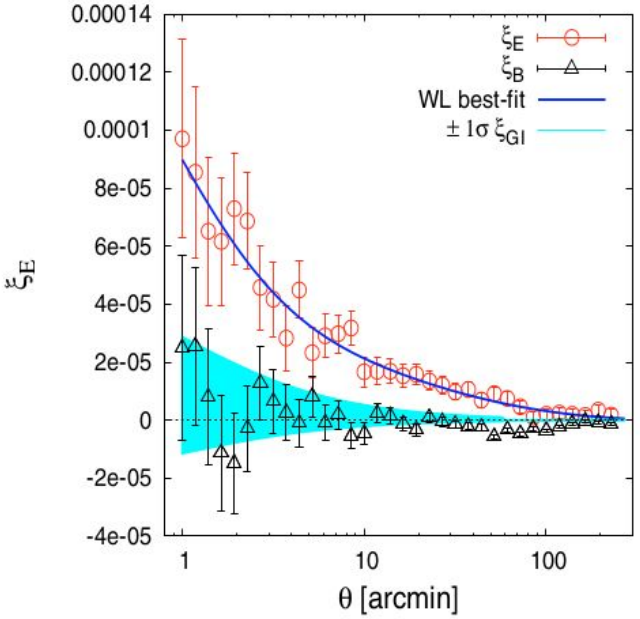
Martin Kilbinger (CEA Paris-Saclay, France)

Early constraints on IA contribution to (2D) cosmic shear (Fu et al. 2008)

Part of the CFHTLenS cosmic shear + IA measurement (Heymans et al. 2013), $A_{\rm early} = 5.15^{+1.74}_{-2.32}$

Contributed to IA implementation in COSMOSIS for Euclid IST:Forecast paper.

Planning to use UNIONS/CFIS weak-lensing data to measure IA.



Sven Heydenreich (Argelander-Institute for Astronomy)

Third-year PhD student, main research interest:
third-order statistics in cosmic shear

- Third-order statistics are more sensitive to the IA signal (Semboloni et al. 2008)
- A combination of second- and third-order statistics can constrain the IA signal intrinsically (Pyne et al. 2021)
- Third-order statistics can be used to test IA models and constrain the IA effect

Romain Paviot (CEA Saclay)

Previously PhD student at LAM (Marseille) working on the redshift space clustering of luminous red galaxies

Projets at CEA :
Investigate cosmological constraining power of
TATT predictions on Euclid/Hydros simulations
Cross correlation between eBOSS and DESy3 galaxies (Pgg + Pgm)

Sandrine Codis (LCEG/AIM, CEA-Saclay)

CNRS researcher @ Saclay (previously @ IAP) interested in

- IA theoretical modelling (and cosmic web-galaxy connection in general) through PT, constrained random field theory, extrema statistics, e.g anisotropic tidal torque theory (Codis+2015b)
- IA in DM and hydro sims, within the Horizon project mainly, (Codis+2015a and with Elisa Chisari afterwards)

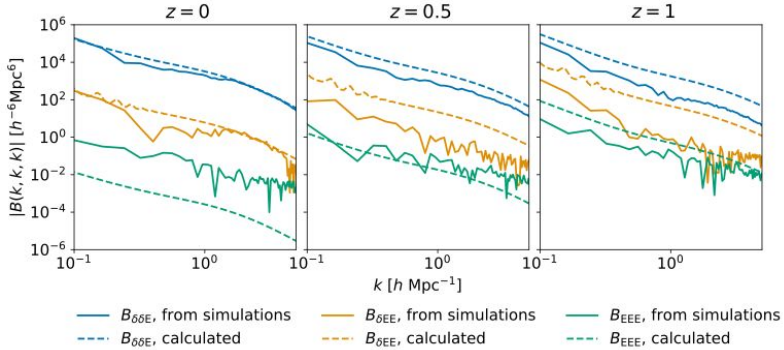
Would also like to investigate:

- IA for higher order statistics
- hybrid modelling between theory and simulations

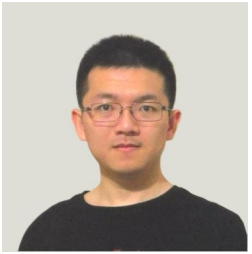
Susan Pyne (University College London)

Postdoc, interested in three-point IA statistics:

- for self-calibration of weak lensing data
- analytical modelling
- measurement from simulations - DM and galaxies



Ziang Yan (GCCL, Ruhr-University Bochum)



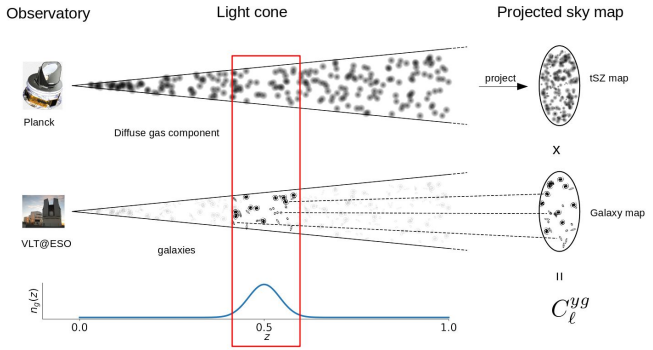
Postdoc fellow, working on cross-correlating different LSS tracers; weak-lensing infrastructure software development

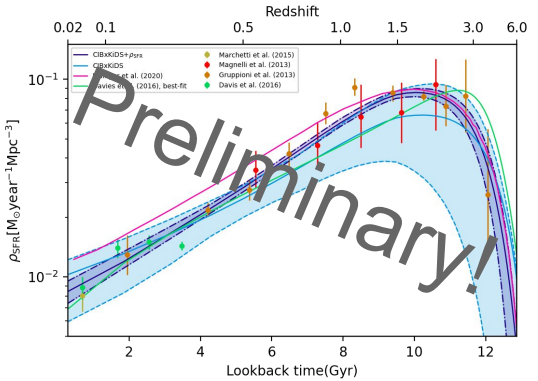
Current project:

- Cosmic star-forming history from CIB anisotropies
- Photometric and spectroscopic realisation from cosmoDC2 catalog
- Cosmic shear analysis for Canada-France Imaging Survey

Interested in IA because:

- May be interesting to combine/cross-analyse IA with other tracers (tSZ, etc)
- It’s an important systematics for cosmic shear analysis





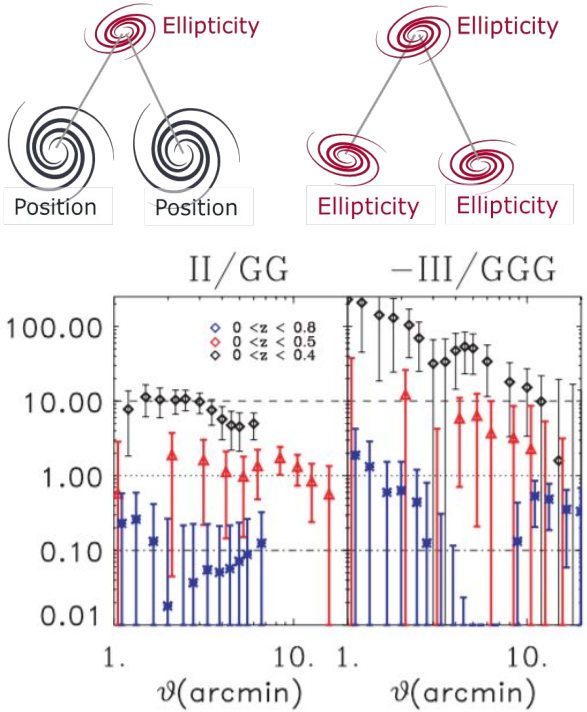
Laila Linke (Bonn University, AIfA)

Postdoc, interested in **measurement + modelling of third-order statistics of shear and galaxy positions**

Interested in IA because:

- Accurate IA models **needed for cosmological inference** from 3rd order shear statistics
- Ratio **IA-Signal to Cosmic-Shear signal higher** for third-order statistics (e.g. Semboloni+ 2008)
- Could probe dependence of IA on environment, e.g., filaments vs clusters, or **preferred alignment direction** (with / against filament direction)

⇒ 3rd order statistics are potentially observables for constraining IA model (in particular combined with 2nd order statistics, Pyne+ 2021)

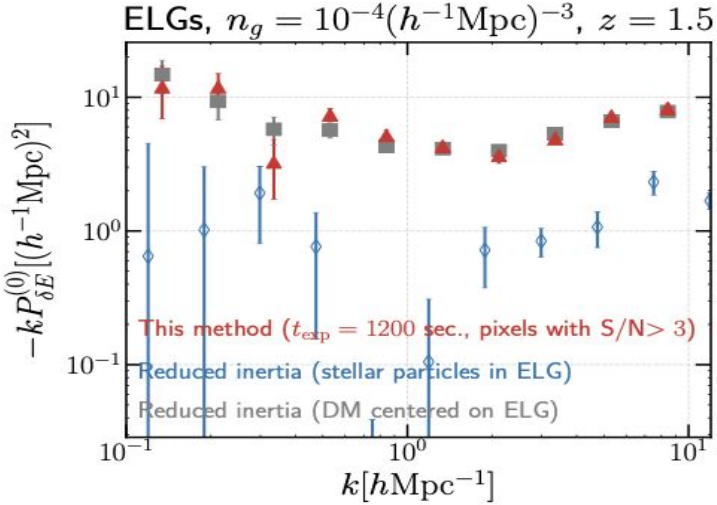


Semboloni + (2008)

Jingjing Shi (Kavli IPMU, University of Tokyo)

Postdoc fellow, interested in IA measurement and modeling.

- DM/Galaxy IA (shape and spin) in simulations (N-body and Hydrodynamic simulations, i.e. IllustrisTNG, Shi+2015, 2021a)
- Developing IA estimators for extracting cosmological information in ELGs targeted surveys (Shi+2021b)
- Working on measuring IA of LRGs in HSC survey



Shi+2021b

Aperture shape estimator *captures* the IA signal surrounding the ELGs

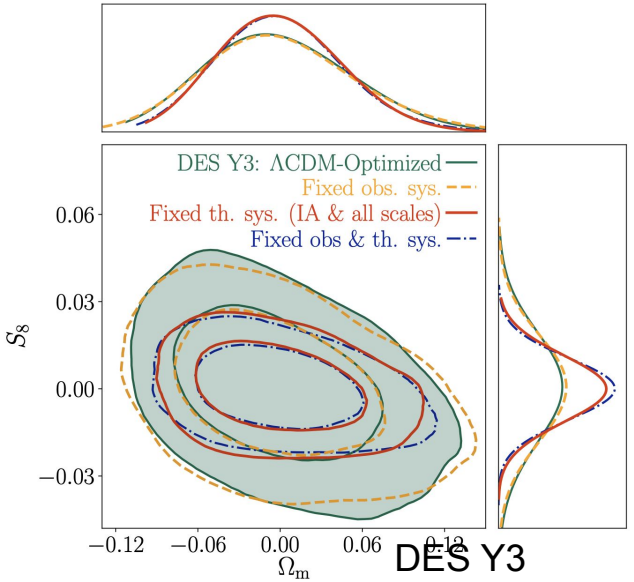
$$I_{ij}^{\mathrm{ap}} = \frac{\sum_{n;(S/N)_{\mathrm{pix}}>3;r_n^{\mathrm{2D}}\leq 500h^{-1}\mathrm{kpc}} f_n x_{ni} x_{nj}}{\sum_{n;(S/N)_{\mathrm{pix}}>3;r_n^{\mathrm{2D}}\leq 500h^{-1}\mathrm{kpc}} f_n}$$

Alex Amon (Cambridge University)

- Snr Kavli Fellow at the IoA/Trinity College
- Involved in DES, KiDS, DESI, DESC

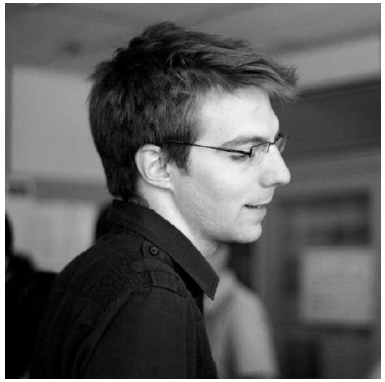
Interested in:

- All things weak lensing
- Direct detection IA measurements with DESI + lensing surveys - with Niall Jeffrey, Benjamin et al!
- Dependence of IA with observed galaxy properties - with Elisa Legnani and Daniel Gruen!



DES Y3
Amon+2021

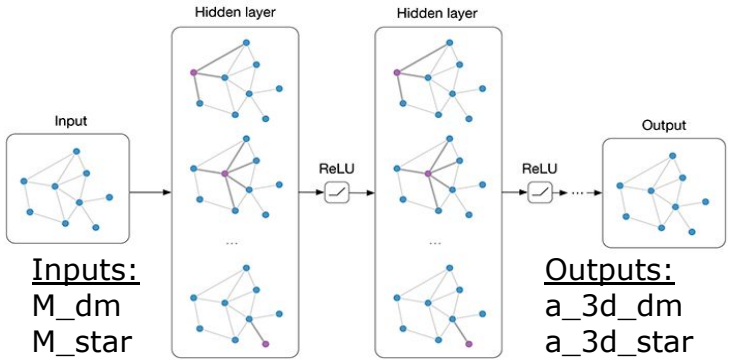
Francois Lanusse (CEA Saclay)



- Interested in modeling IA from hydro sims for survey simulation purposes (working on this in LSST DESC), and forward modeling.

- Developing machine learning based methods being developed with Yesukhei Jagvaral, Rachel Mandelbaum, and Danielle Leonard.

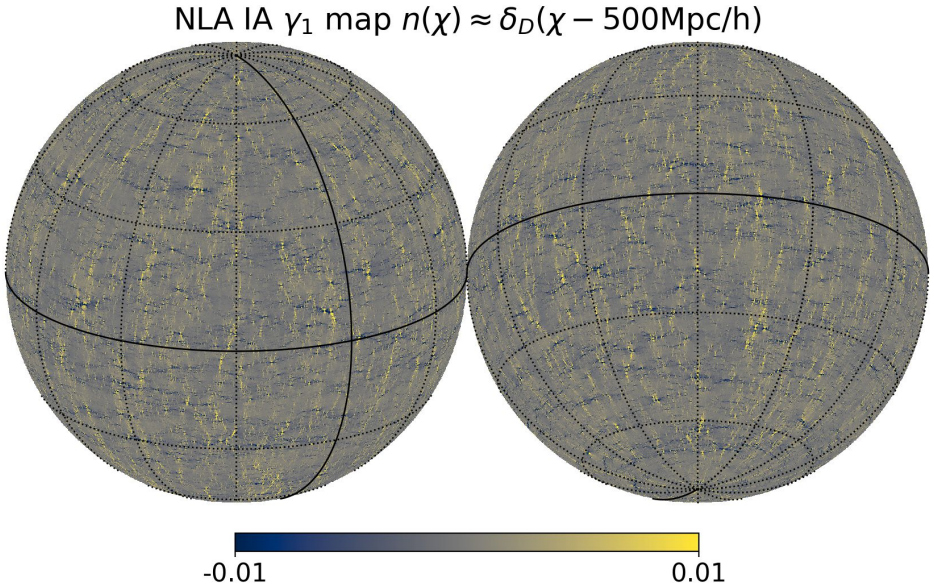
- Planning to use UNIONS/CFIS weak-lensing data to measure IA.



(see Yesukhei's slides for latest results)

Niall Jeffrey (University College London)

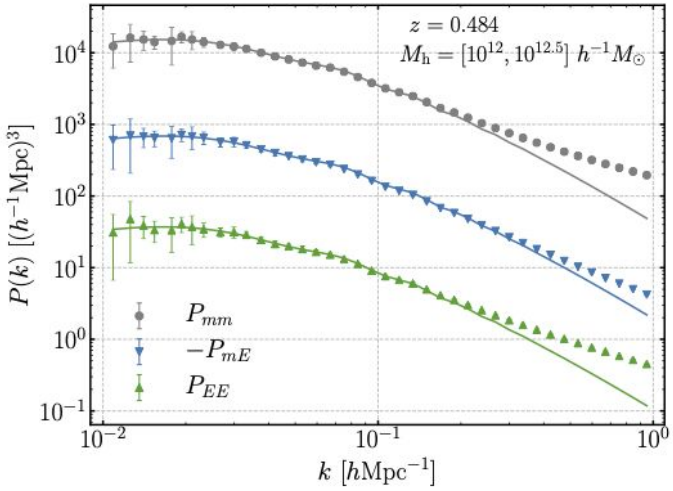
- Direct IA measurement and modelling (DESI) with Benjamin J, Alex et al.
- IA forward modelling for simulation-based – “likelihood-free – cosmological inference (DES, Euclid)



Toshiki Kurita (University of Tokyo, Kavli IPMU)

PhD student working with Masahiro Takada, interested in cosmological information content in IA

- IA power spectrum of dark matter halos in sims (Kurita et al. 2020)
- Scale-dependent bias in IA with spin-2 primordial non-Gaussianity (Akitsu et al. 2021)
- Working on developing analysis method for IA power spectrum from real data (e.g. SDSS LRG)

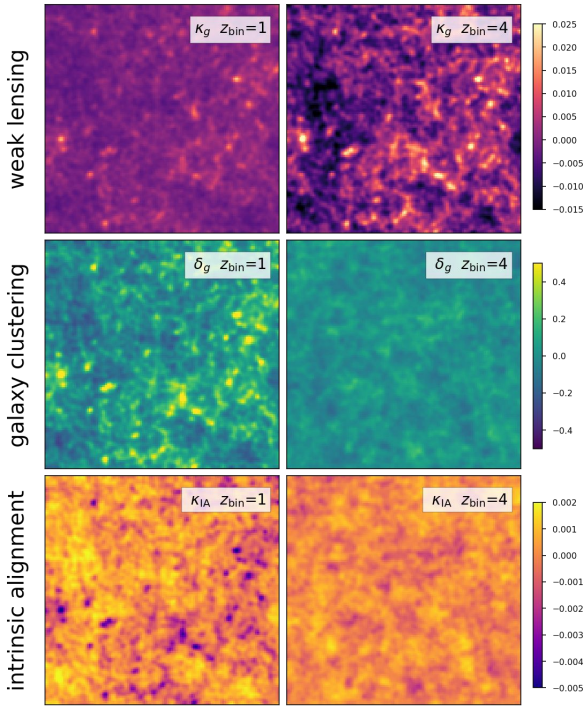


Elisa Chisari (Utrecht University)

- Models of intrinsic alignments
  - Halo model: Fortuna+ being redeveloped into anisotropic halo model of IA - w/ B. van Zwol
  - EFT of alignments: with Vlah & Schmidt + generalisation of projected stats of spin-2 fields
  - Implementation in DESC pipelines (CCL) - w/C. Georgiou
- Testing with simulations
  - Extensive work with Horizon-AGN (w/S. Codis, C. Laigle, K. Hoffman)
    - Redshift/luminosity evolution
    - When galaxies align
  - Back to the basics: N-body (work w/T. Bakx, T. Kurita, M. Takada)
- Information from IA
  - Cosmological: non-Gaussianity/primordial GW/DM
  - Gxy evolution: AGN feedback, merger history
- Observational work with H. Hoekstra, M. C. Fortuna, H. Johnston & C. Georgiou (KiDS)
- Recent interest in alignments of clusters

Tomasz Kacprzak (ETH Zurich/ Swiss Data Science Center/ Paul Scherrer Institute)

- Working with Silvan and Jonathan on quantifying the impact of redshift errors (including n(z) shape) on S8 and IA parameter inference with 2pt functions
- Working on constraining IA parameters with forward modelling and deep learning
- Interested in building N-body simulation grids with different IA models
- Including IA effects in CosmoGrid → a large lightcone simulation grid, which will be public soon
- Currently leading the DES Simulations Working Group



Example simulation of lensing, clustering and IA, 5x5 deg, Kids450 redshift bins

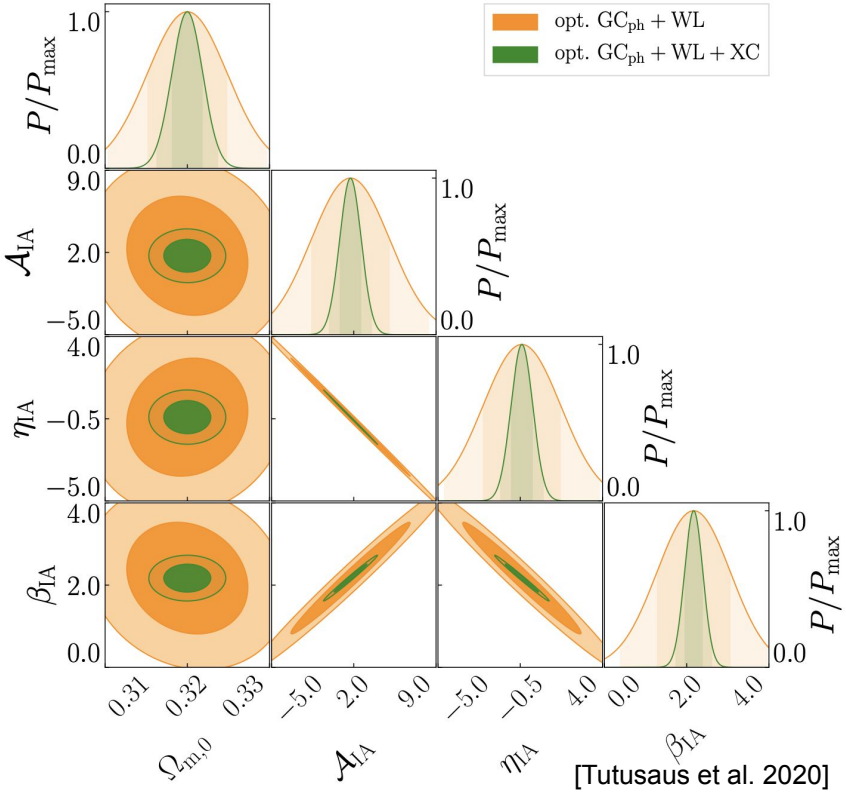
Stella Seitz (USM, LMU Munich)

- I would like to understand the most recent modelling concepts for IA
- Goal is to include an up to date IA model when “measuring” higher order shear CFs (forecasts and real measurements).
- I have no experience with IA yet.

Isaac Tutusaus (Université de Genève)

Postdoc interested in IA constraints from joint analyses and crosstalk with systematic effects.

- Impact of Euclid GC-WL cross-correlations on IA constraints:
- Currently developing Euclid forecasts to study IA in a joint analysis



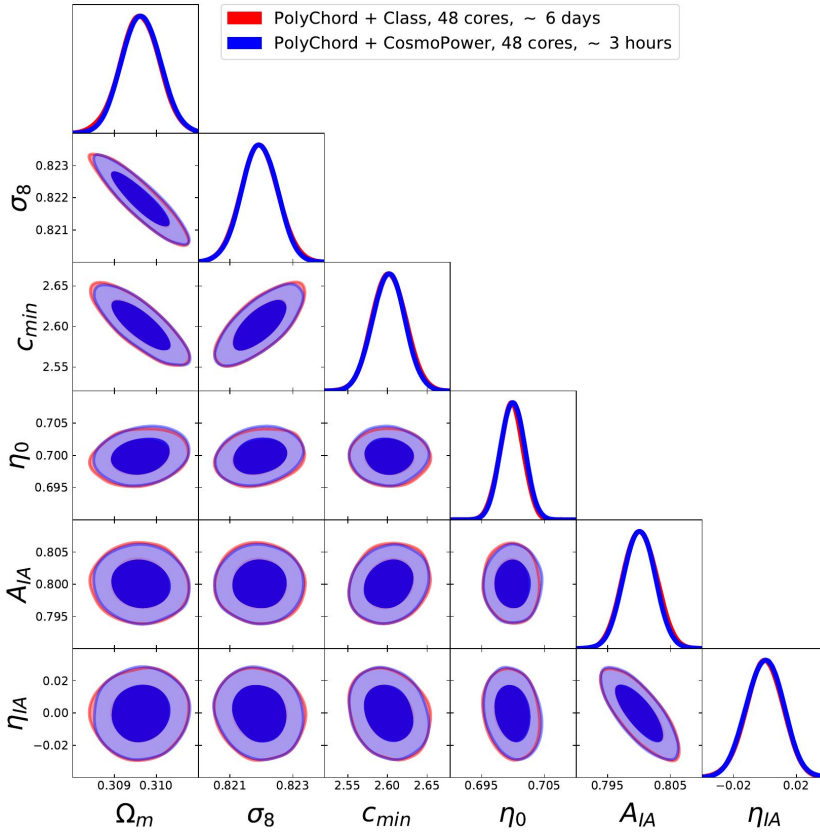
[Tutusaus et al. 2020]

Alessio Spurio Mancini (University College London)

- Postdoc working on Deep Learning for accelerated Bayesian cosmology (check out CosmoPower: hyper-fast Bayesian inference from LSS and CMB surveys)

- Leading the Euclid Weak Lensing Science Performance Verification end-to-end pipeline → interested in latest IA models to include them in this framework

- Interested in using AI to model IA :)

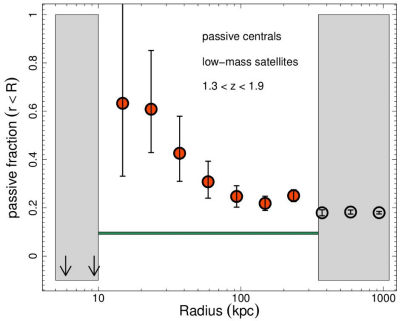


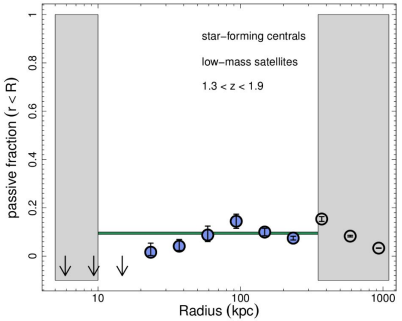
Spurio Mancini + 2022

Will Hartley (University of Geneva)

- Interested in galaxy evolution, and in particular the role that the near and large-scale environment plays in shaping galaxies' lives.
- Keen to see what information we can bring in from galaxy evolution to IA study, and vice versa.
- Worked a lot on photometric redshifts for WL cosmology, and morphological properties of galaxies.

Hartley et al. (2015)

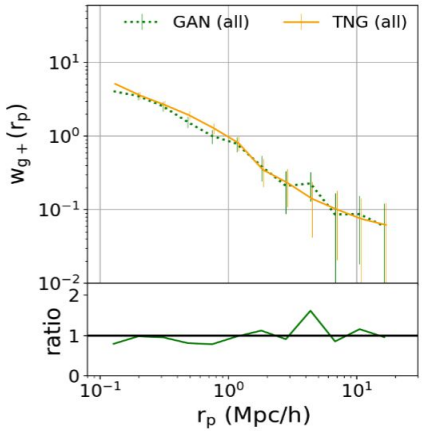




Yesukhei Jagvaral (Carnegie Mellon University)

PhD student advised by Rachel Mandelbaum, interested in IA and cosmology

- Galaxy models for IA
- IA with Deep Generative models
- Fast mock catalog production with IA
- Simulation-based inference?



Collaborators: Duncan Campbell, Francois Lanusse, Sukhdeep Singh, Markus Michael Rau.

Harry Johnston (Universiteit Utrecht)

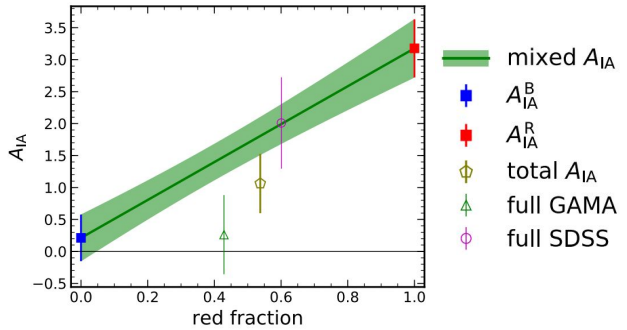
Post-doc with Elisa Chisari, former PhD student of Benjamin Joachimi at UCL

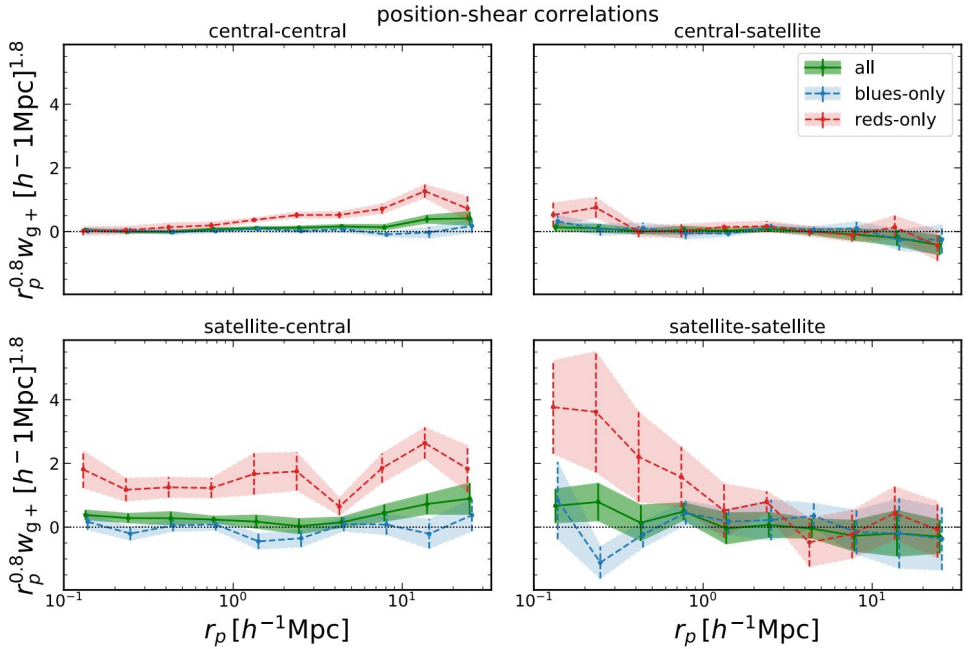
Direct IA measurements in KiDS+GAMA (+NLA fitting & forecasting for colour-split cosmic shear) & PAUS (compensating photo-z errors w random clones+)

Other direct IA analyses in KiDS

Measurements, code available for a grand reanalysis

Also interested in IA vs. mergers in simulations





Johnston,Georgiou,Joachimi,Chisari,etal.'19

Elisa Legnani (University of Milan, LMU Munich)

Master student supervised by Daniel Gruen and Alex Amon, involved in DES

Interested in:

- scaling of IA with galaxies physical parameters
- IA models for cosmic shear measurements

Daniel Gruen (LMU Munich)

- Faculty at LMU Munich, active in a linear combination of DES, DESI, DESC, Euclid, 4MOST

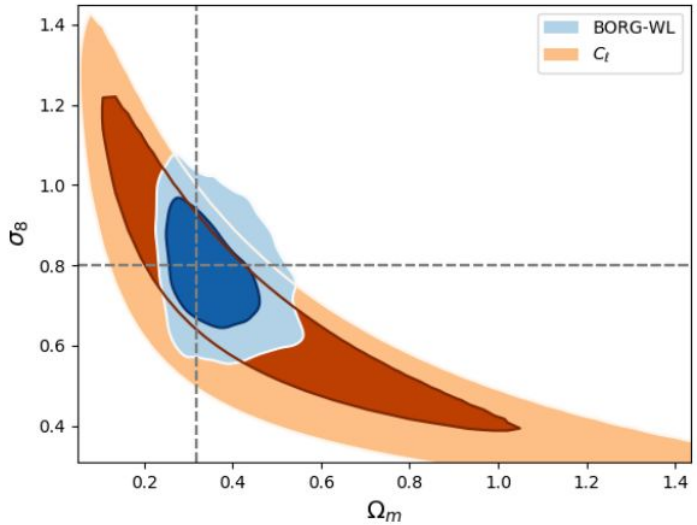
  Interested in:

- building a lensing-cosmology-enabling model for the galaxy population that connects “true” galaxy properties (redshift; physical parameters that correlate with IA) to observed properties / sample selection
- photo-z / shear calibration and relation to IA modeling
- spectroscopic galaxy surveys (DESI/4MOST) as a way of informing this model

Natalia Porqueres (Imperial College)

Interested in IA modelling for simulation-based inference

Developing a field-based inference approach using forward models (BORG-WL)



David Cid (Ciemat, Madrid)

- 2nd year PhD student under the supervision of Eusebio Sánchez and Nacho Sevillla
- Active in DES, DESC and PAUS
- Interest: learning about IA modelling
- Starting a IA project considering PAUS W3 field data

Juan Mena Fernández (CIEMAT, Madrid)

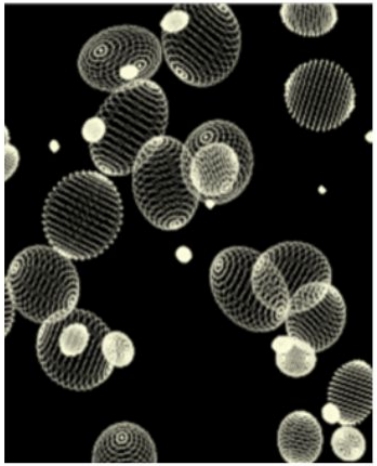
- 3rd year PhD student at CIEMAT (Madrid)
- Currently mainly working in the DES Y6 BAO analysis
- Also working in BAO-related topics in DESI
- Starting to work in an IA project using angular correlations with PAUS W3 field data

Claire Lamman (Harvard University)

Studying IA as an RSD contaminant
for the DESI survey via:

- Polarization from DESI's target selection
- Measuring projected IA
- Interpretation via AbacusSummit mocks

DESI Legacy
Imaging Survey
Schlegel et al. 2021



AbacusSummit
Maksimova et al. 2021

CENTER FOR
ASTROPHYSICS
HARVARD & SMITHSONIAN

DARK ENERGY
SPECTROSCOPIC
INSTRUMENT
U.S. Department of Energy Office of Science

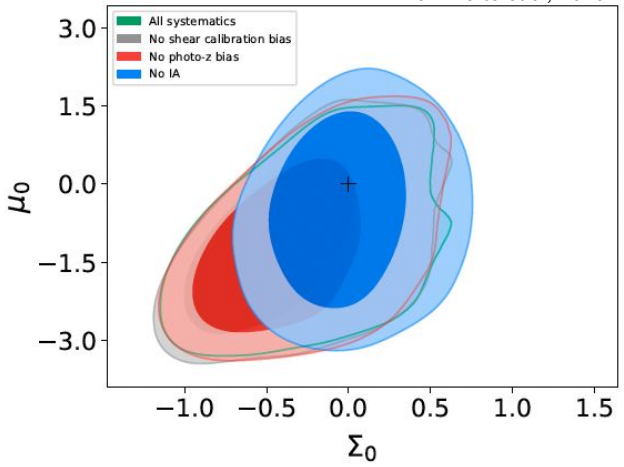
Agnès Ferté (JPL/Caltech)

- Past and current research:
  - Modeling 3x2pt in non standard cosmological models: Current tests of beyond LCDM models with DES Y3 using NLA
  - IA is cosmic shear systematics with the largest impact on tests of gravity (Ferté et al, 2019)

→ Which IA modeling for future beyond LCDM tests?

- Future projects:
  - Further tests of the IA models on data: measurements of IA in density dependent environments
  - Use IA as a probe. Interested in direct detection of IA:
    - Develop automatized tools for by producing shape catalog emulator
    - Test gravity

From Ferté et al, 2019



Niko Sarcevic (Newcastle University, UK)

- PhD (supervisor: Danielle Leonard)
- LSST-DESC member
- Currently working on jointly modelling IA, galaxy bias and photometric redshifts
- Collaborators: D. Leonard, M. M. Rau, F. Lanusse, J. Blazek
- I co–organize Cosmology from Home
- Made https://www.cosmoracle.com with friends
- I love coats, shoes, hamsters, spicy food and data viz

No plots currently - work in progress. Expect soon (and not soon on academic timescales. promise)

Gary Bernstein (U. Pennsylvania)

Weak lensing geezer faculty annoyed by IA for 20+ years.

My current IA interest is inclusion of purely symmetry-based IA models (e.g. TATT) in WL/clustering analyses that work by sampling over all possible mass fields. IA's would be estimated directly from the tidal fields of proposed mass maps.

Apologies in advance that my attendance will be intermittent due to teaching and advising commitments.

Sara A. Safari (ETH Zürich)

(Sara Aliqolizadehsafari)

- Scientific assistant at ETH Cosmology group developing a pipeline for HI 21cm Intensity Mapping under the supervision of Alexandre Réfrégier
- A recent member of the Square Kilometer Array (SKA) Cosmology working group
- Master's thesis in IA under the supervision of Jonathan Blazek and Danielle Leonard at EPFL
- Separating IA and Weak Lensing signal for DES Y1

Zhengyangguang Gong (USM, LMU Munich)

First-year PhD student in the group of Stella Seitz, mainly interested in

modelling and measuring higher-order statistics of cosmic shear and weak lensing convergence.

- Interested to know the up-to-date concepts in modelling IA

- How to incorporate IA effects into higher-order correlation functions such as the integrated shear 3PCF by Halder et al (2021).

Rachel Mandelbaum (Carnegie Mellon University)

All-around weak lensing enthusiast, from detector/PSF effects to theoretical models to statistical inference to science (galaxy-halo connection, cosmological parameters, constraints on gravity on cosmological distance scales).

Have worked broadly on intrinsic alignments: Direct measurements, method development, theoretical modeling (sims), mock catalogs

Ongoing IA mock catalogs work in project pitch by Yesukhei Jagvaral; observational project with Simon Samuroff, Jonathan Blazek; model selection with Andresa Campos, Simon Samuroff.

We've learned a lot since early IA detections, and I'm excited to strategize about next steps towards where we need to be for LSST, Euclid, Roman WL.

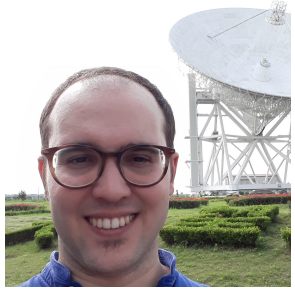
Anik Halder (LMU Munich)

- PhD student. Advisor: Stella Seitz

- Working on statistics of projected cosmic density fields → integrated shear 3PCF (Halder++2021 , Halder&Barreira2022) and tracer-matter PDF (Friedrich++2021)

- Eager to learn about IA theoretical modelling in the context of higher-order shear correlations

Jacobo Asorey (CIEMAT, Madrid)



Postdoc at CIEMAT (Spain)

- Active in PAUS, EMU and SKA Cosmology group
- Interested in IA detection and modelling.
- Involved in an IA project with angular correlations with PAUS W3 field data and beyond.

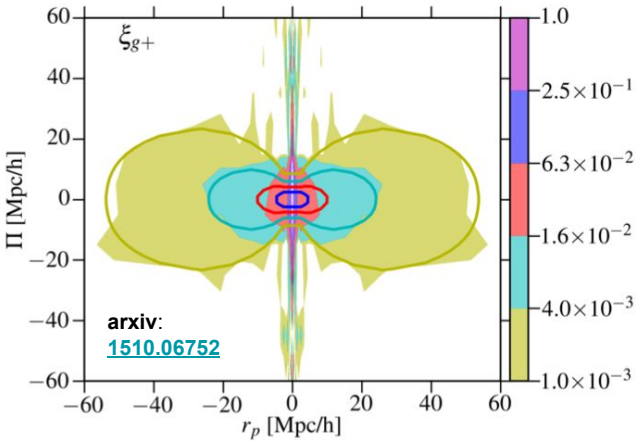
David Navarro Gironés (ICE, Barcelona)

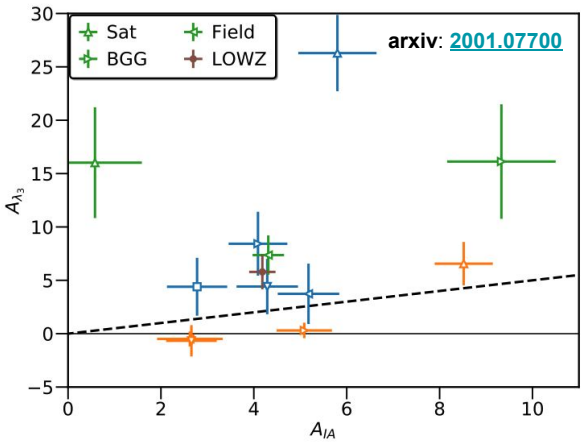
- 2nd year PhD student (supervisors: Dr. Martin Crocce and Dr. Enrique Gaztañaga)
- Interested in IA (2-point correlations)
- Involved in a PAUS project to create new photo-z catalogues and use them to measure IA in the Wide CFHTLenS fields.

Sukhdeep Singh (Carnegie Mellon)

- Measured galaxy shape (IA) and size correlations with environments.
  - Dependence galaxy properties
  - Effects of projected shapes on IA models.
  - Systematics

- Interested in modeling and novel measurements to test IA models.





Anna Wittje (GCCL, University of Bochum)

- 1st year PhD student supervised by Hendrik Hildebrandt
- currently working on redshift calibration related projects in KiDS, PAUS and CFIS/UNIONS

interested in:

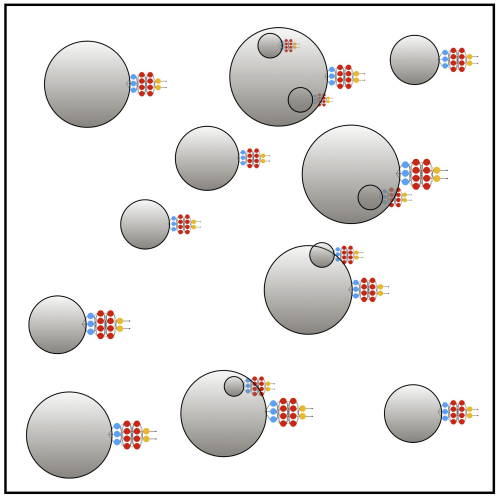
- involved in direct IA measurement in PAUS fields
- learning about IA modelling for weak lensing analysis

Tassia Ferreira (LIneA, Brazil)

- Postdoc at LIneA
- Have been working mostly with covariance matrices of cosmic shear statistics.
- Part of the task-force to evaluate the DESC CCL N5K challenge and deliver a fast and accurate method for non-Limber calculations.
- Interested in IA modelling and extracting its signal to use it as a cosmological probe.

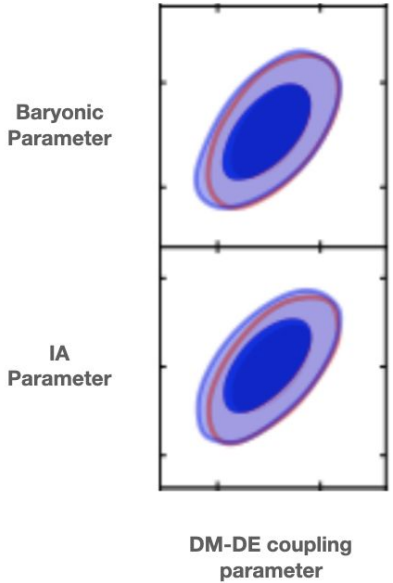
Andrew Hearin (Argonne National Lab)

- Develop simulation-based galaxy–halo models of IA
- Derive posteriors on IA from small scale measurements to use as priors on large-scale analyses
- Generate mocks with realistically complex IA, including variations that span the physically plausible range and character of the effects



Alkistis Pourtsidou (Univ. of Edinburgh)

- Which are the best IA models for Stage-IV surveys like Euclid?
- IST:nonlinear pipeline development (with Jonathan, Martin, Isaac, …)
- Very interested in the impact of IA when testing non-standard cosmologies (interacting dark energy, modified gravity …)

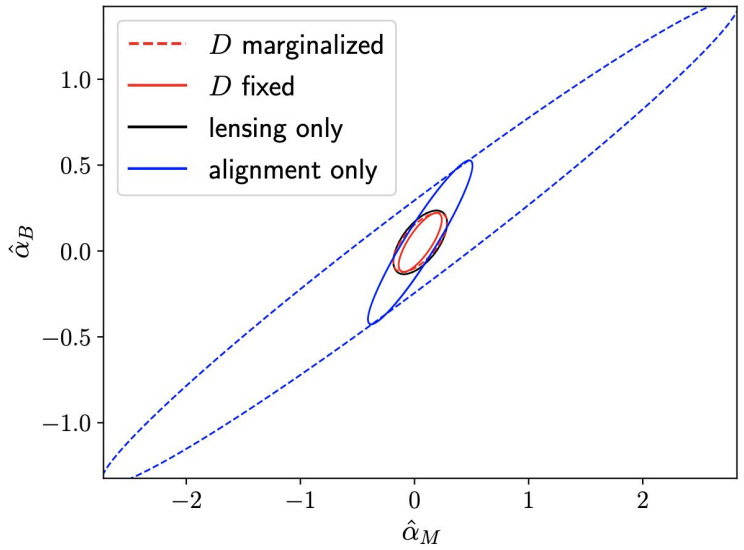


Apologies in advance for only partially attending (too many conflicts this week)

Spurio Mancini & Pourtsidou 2022

Robert Reischke (GCCL, University of Bochum)

- Postdoc in Bochum (as part of KiDS)
- modelling of IA from theoretical perspective
- Separating IA signal from WL signal
- IA and modified gravity



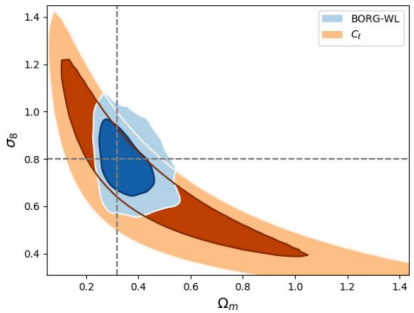
Alan Heavens (Imperial College)

Have been interested in/worried about IA since the last century…

Incorporating IA into forward modelling with Bayesian Hierarchical Models (see Natalia Porqueres' slide). Advantage: we have access to the tidal field

Also emuPk: fully differentiable power spectrum emulator, can be used for IA: https://github.com/Harry45/emuPK (Mootoovaloo et al 2021)

Apologies - participation will be patchy due to other commitments



BHM does much better than two-point statistics, from the same data (Porqueres et al 2021)

Joachim Harnois-Déraps (Newcastle University)

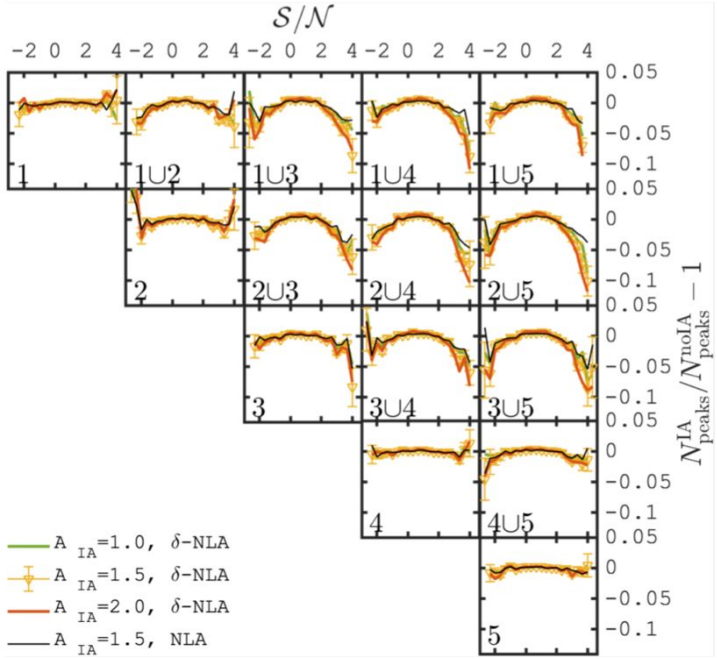
Background in weak lensing simulations

Interested in weak lensing higher-order statistics (peak statistics, lensing PDF, ML)

No model for most of these probes, so we must rely on simulation-based inference with IA

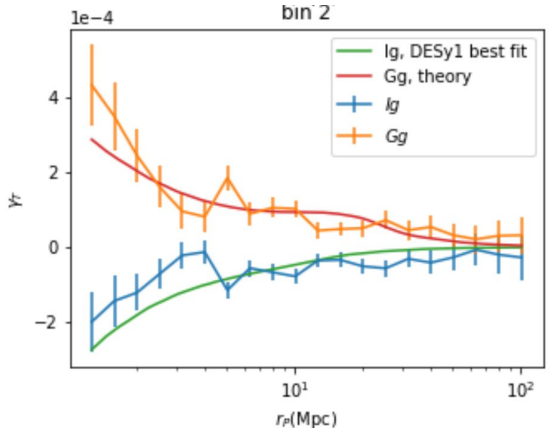
On going IA effort: Infuse IA in mock weak lensing data for Stage-IV lensing surveys

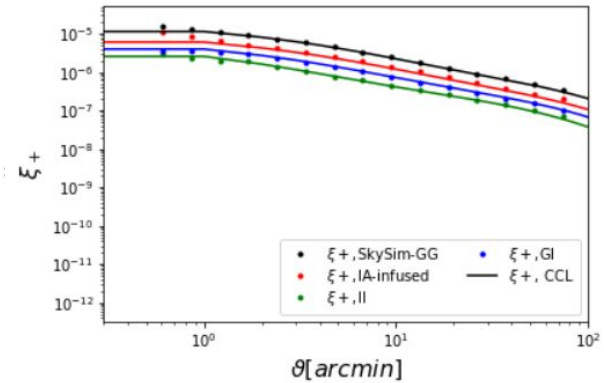
See our IA-infusion paper if interested

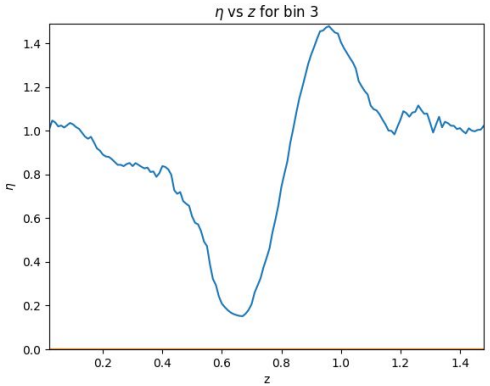


Leonel Medina Varela (University of Texas at Dallas)

- PhD Student working with Mustapha Ishak
- IA mitigation methods in DESC pipelines
- IA infusion in DESC SkySim5000
- IA detection methods comparison in DESI
- Google Jax for GPU acceleration in numerical integrals like the Eta function in the IA Self-Calibration





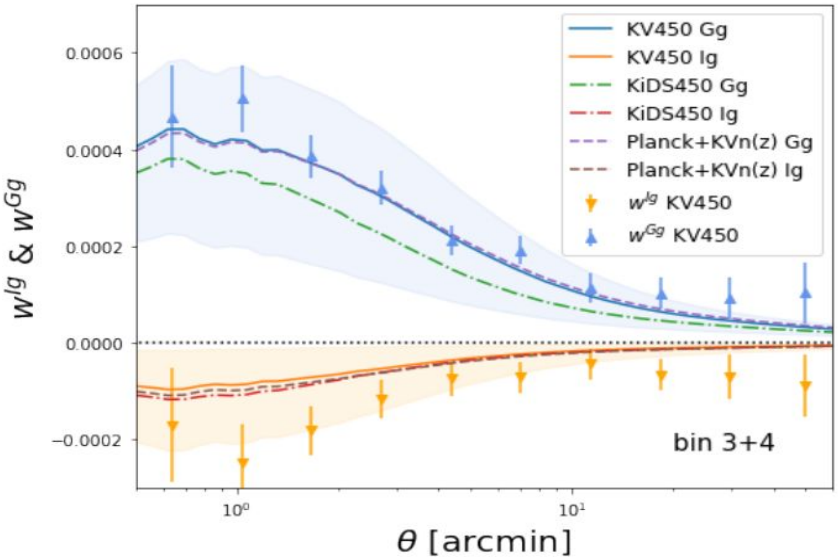


Mustapha Ishak (University of Texas at Dallas)

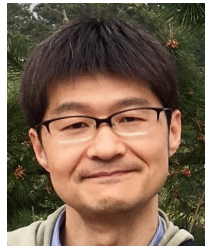
- Interested in IA modeling and mitigation for ongoing and future surveys
- *Became contaminated by IA around 2005,* after first detection of GI in SDSS(developed one of the 2 pipelines in Mandelbaum, Hirata, Ishak et al. 2006; Hirata, Mandelbaum, Ishak et al. 2007)
- Brought IA self-calibration from a theoretical idea to tangible pipelines and a first detection in photo-z surveys (Yao, Pedersen, Ishak et al. 2020; Pedersen, Yao, Ishak et al. 2020)
- IA review (Troxel & Ishak, Physics Report 2014)
- Now: IA mitigation methods in DESC pipelines
- Now: IA infusion in DESC SkySim5000
- Now: Ongoing IA projects in DESC with students and collaborators

Yao, Pedersen, Ishak et al. MNRAS 2020 —>

Before and after the pandemic



Atsushi Taruya (YITP, Kyoto University)



Interested in IA as a novel cosmological probe

Of particular interest is the anisotropic nature of IA statistics in 3D space, which can be used to constrain and test cosmology through the measurements of

- Baryon acoustic oscillations
- Redshift-space distortions

AT & Okumura (‘20),
Okumura, AT & Nishimichi (‘20)

Last year,

We had a focused workshop on IA & cosmology at Kyoto (29th Nov–3rd Dec)

(workshop webpage is here)

We are also planning to organize (in-person) international workshop at Kyoto this year.

Please stay tuned for more details (will be announced here)

Martin Crocce (Institute of Space Science BCN)

Interested in how to model / interpret IA in the analysis of

- **DESY6 data** (y6kp): final DES data analysis, 4500 deg2 (same as DESY3) but ~ 50% more source galaxies, lots of decision making there.
- **Euclid 3x2** : development of the euclid modeling pipeline, IA plays a central role
- **Direct IA measurements in PAUS data**, narrow-band photo-z's, no pre-defined selection (aim is to cover the gap mentioned by Rachel albeit using 50 deg2)
- **Modeling IA in MICE simulations** (w/ Kai, Jonathan, Lucas etc) – see Kai's slides, MICE IA mock will soon be public

A Researcher (University of X)

Some words/figures about yourself and your interest and background in IA here