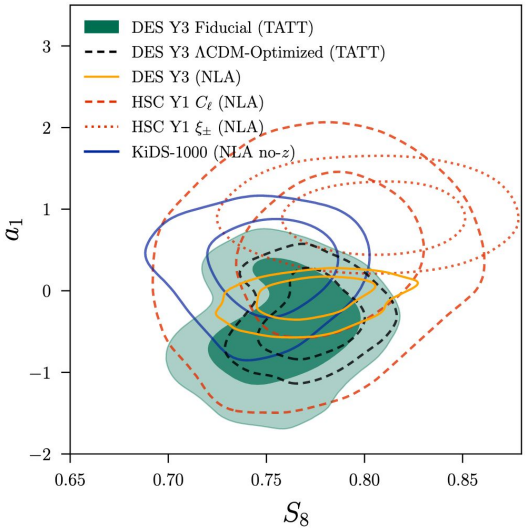
P5: Reanalysis of Cosmic Shear Measurements from the Dark Energy Survey

Background: The Dark Energy Survey (DES) is a photometric survey that mapped an eighth of the sky over five years of observations. This data set provides information of the positions, shapes and (photometric) redshifts of several hundreds of millions of galaxies. This data set enables new insights on all astronomical scales, from the detection of new objects in the solar system and Milky Way Satellites to constraints on cosmological parameters.Our project will use the value-added data products from the DES Year 3 data release to study weak gravitational lensing as a cosmological probe.

Project Goal: In this project we will constrain cosmological parameters and systematics using the cosmic shear correlation functions measured by the DES collaboration. We will focus on theoretical models for weak lensing and intrinsic alignments and characterize the impact of assumptions about intrinsic alignments on cosmological parameters by re-analyzing DES cosmic shear data using ML-accelerated inference.

Necessary Concepts:
a) Cosmology, Weak Lensing, Correlation functions, ML-accelerated inference
b) Programming experience, familiarity with C/python, CLASS, MCMC

Background resources:
DES (https://www.darkenergysurvey.org/)
Intrinsic Alignments Review (1407.6990)
DES Y3 Cosmic Shear (2105.13542, 2105.13544)
ML accelerated cosmology inference
CLASS (introductory notebooks on github)
Emcee, multinest, getdist python modules



Marginalized parameter constraints on the amplitudes of structure growth (S8) and linear intrinsic alignments (a1) from DES Y3 and other cosmic shear surveys.
From Secco+(DES, 2105.13544)

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