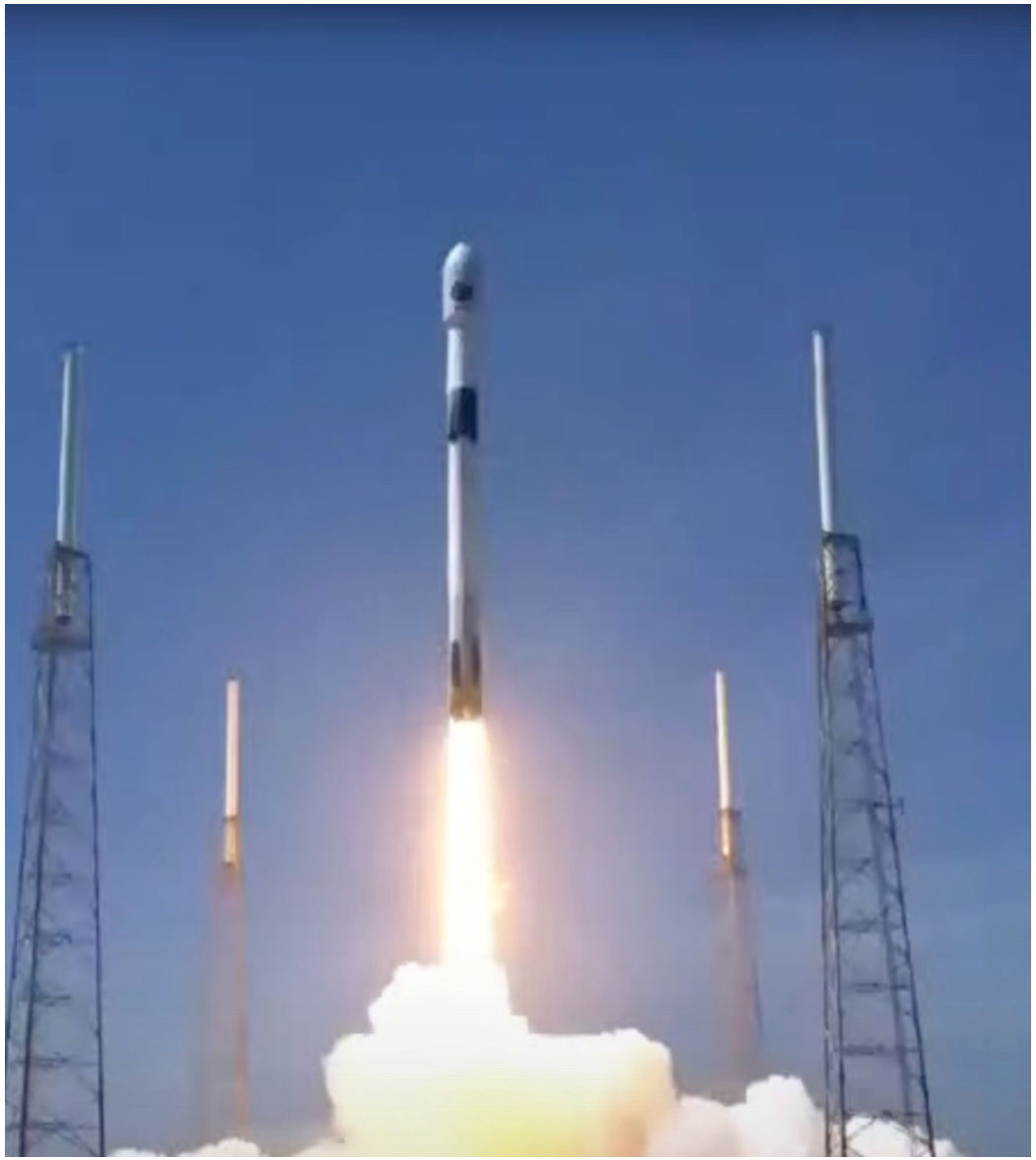
Euclid @UniMI

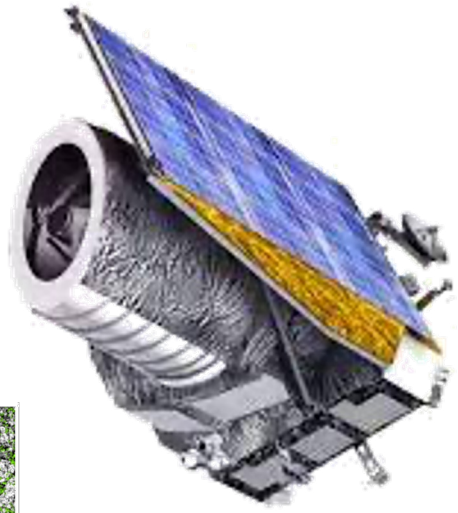
Consiglio Sezione INFN
Milano - 5 Luglio 2023

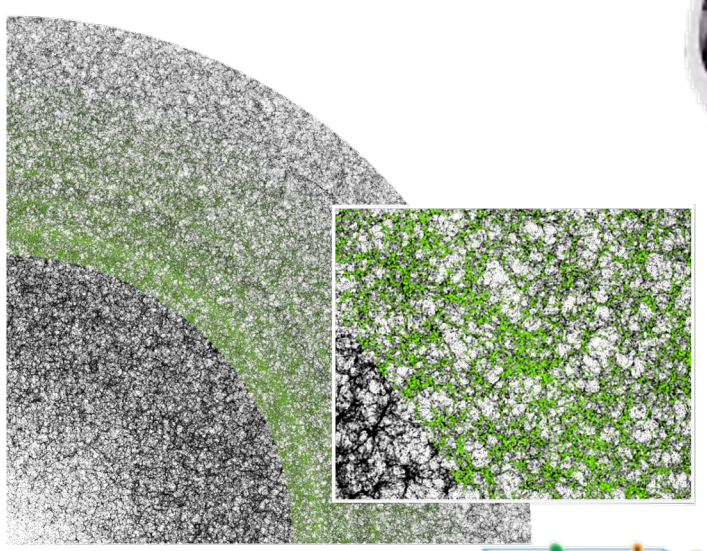

euclid
EXPLORING THE DARK UNIVERSE
1/7/2023
ore 16
Countdown
per Euclid
AULA MAGNA
Dipartimento di Informatica
Università degli Studi di Milano
via Celoria 18
diretta live su
LASTATALE VIDEO
La diretta del lancio del telescopio Euclid da Cape Canaveral accompagnata dal commento dei ricercatori del Dipartimento di Fisica e dell'Istituto Nazionale di Astrofisica (INAF) che hanno lavorato a questa straordinaria avventura scientifica.
Università degli Studi di Milano
- Maria Pia Abbracchio (Prorettrice vicaria)
- Davide Maino (Convenor)
- Maria Archidiacono (Ricercatrice)
- Marina Cagliari (Dottoranda)
INAF
- Carmelita Carbone (Ricercatrice)
- Benjamin Granett (Ricercatore)
- Marco Scodeggio (Ricercatore)
esa
euclid
Ingresso libero fino ad esaurimento dei posti

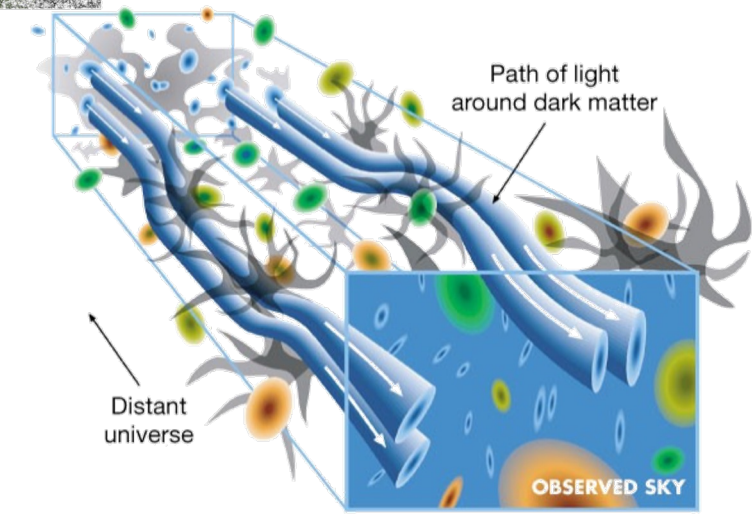


Euclid in a nutshell

- **ESA** M2 space mission in the framework of the Cosmic Vision program
- Launch **July 1st 2023**. Duration **>6 years**
- 1.2m telescope with two instruments: Visible Imager (**VIS**) and Near Infrared Spectrometer and Photometer (**NISP**)
- Wide survey (**15.000 deg^2**) and deep survey (40 deg^2 in 3 different fields)
- Measurements of over **1 billion images** and more than **10 millions spectra** of galaxies out to z>2
- Primary probes: **Galaxy Clustering** and **Weak Lensing**
- Additional probes: **CMB cross-correlation, clusters, strong lensing**
- Main scientific objectives: **Dark Energy**, **Dark Matter**, and **General Relativity**







Euclid @UniMI

Davide Maino

Co-lead of the SDC-IT, SGS-PO, Science Coordinator

Luigi Guzzo

Core Science Coordinator, GC-SWG Coordinator, Chair of the ECPG Science (ECEB)

Ben Granett (INAF)

Co-lead of the “E2E” WP of the GC-SWG, lead developer of the PF LE3-ID-VMSP

Maria Archidiacono

Co-lead of the “Dark Matter and Particle Cosmology” WP of the TH-SWG

Emanuele Castorina

GC-SWG & TH-SWG

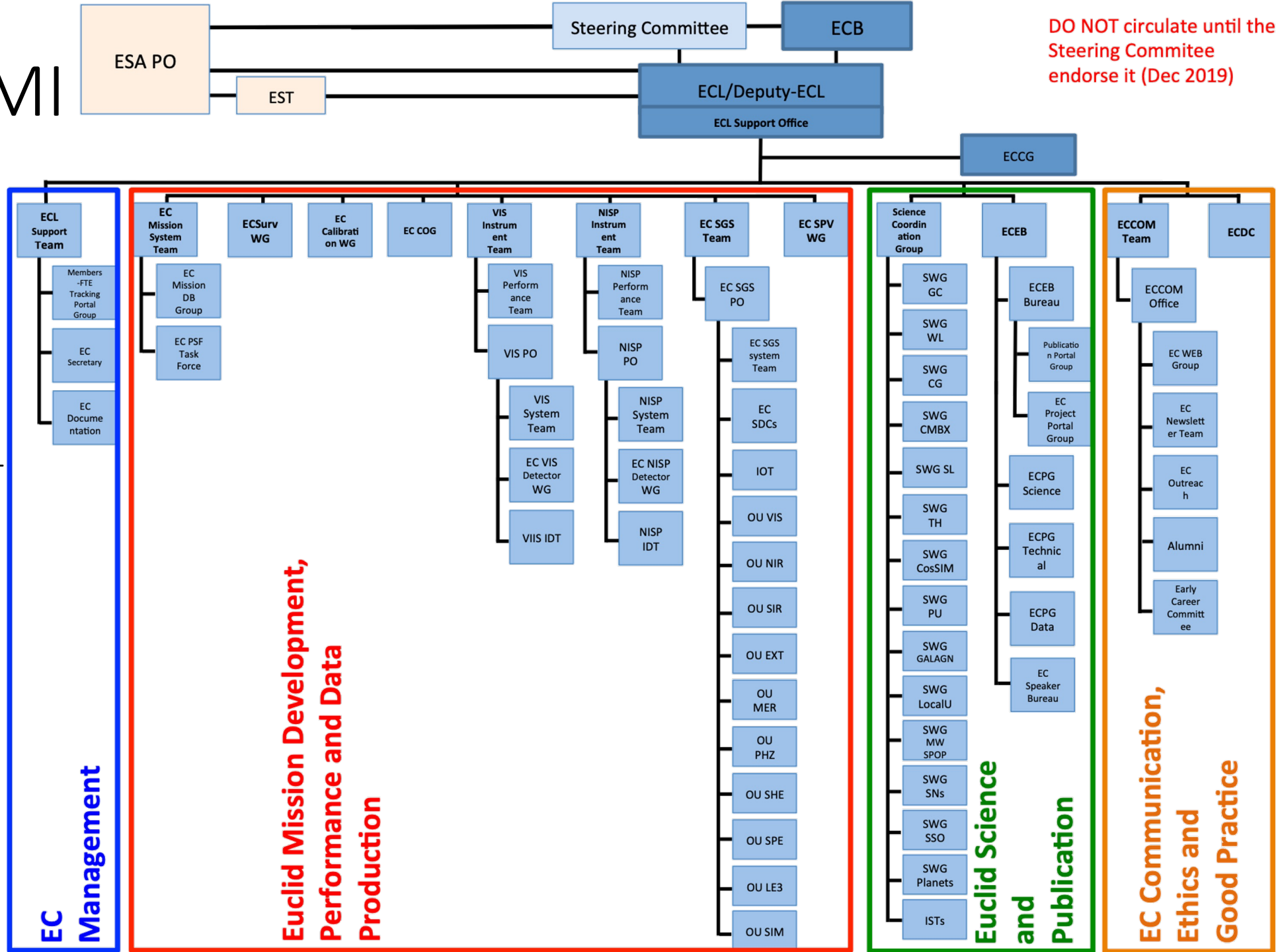
Carmelita Carbone (INAF)

Co-lead of the ”Likelihood” WP of the GC-SWG, and of the “CMBX simulations” WP of CMBX-SWG

Marina Cagliari

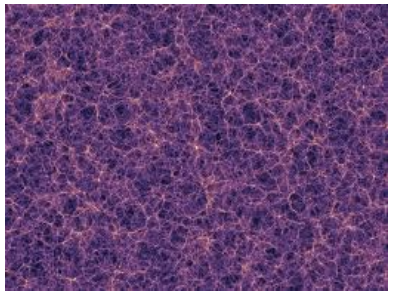
GC-SWG

DO NOT circulate until the Steering Commitee endorse it (Dec 2019)



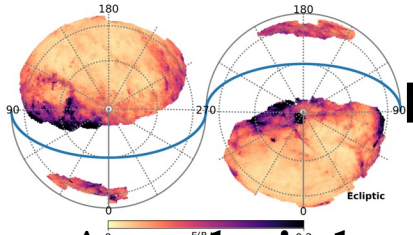
Scientific and preparatory activities

Slide by Gigi Guzzo and Ben Granett

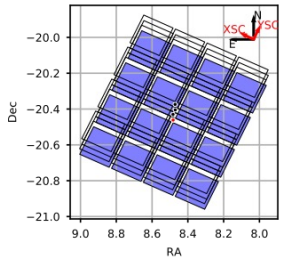


Cosmological sim

Mock galaxies



Astrophysical foregrounds



Survey definition

Survey simulator

Raw data

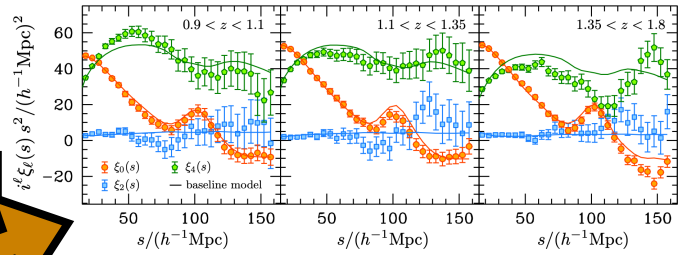
Catalog

Reduction

Measurements

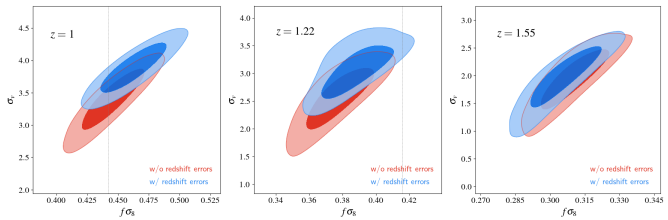
Science Ground Segment:
From raw data to observables
Science Data Centres (Maino)
Pipeline Processing Order (Maino)
Processing Function for LE3 (Granett)

Analysis



GC modelling and higher order statistics (Carbone, Castorina, Cagliari)

Likelihood (Carbone, Archidiacono)

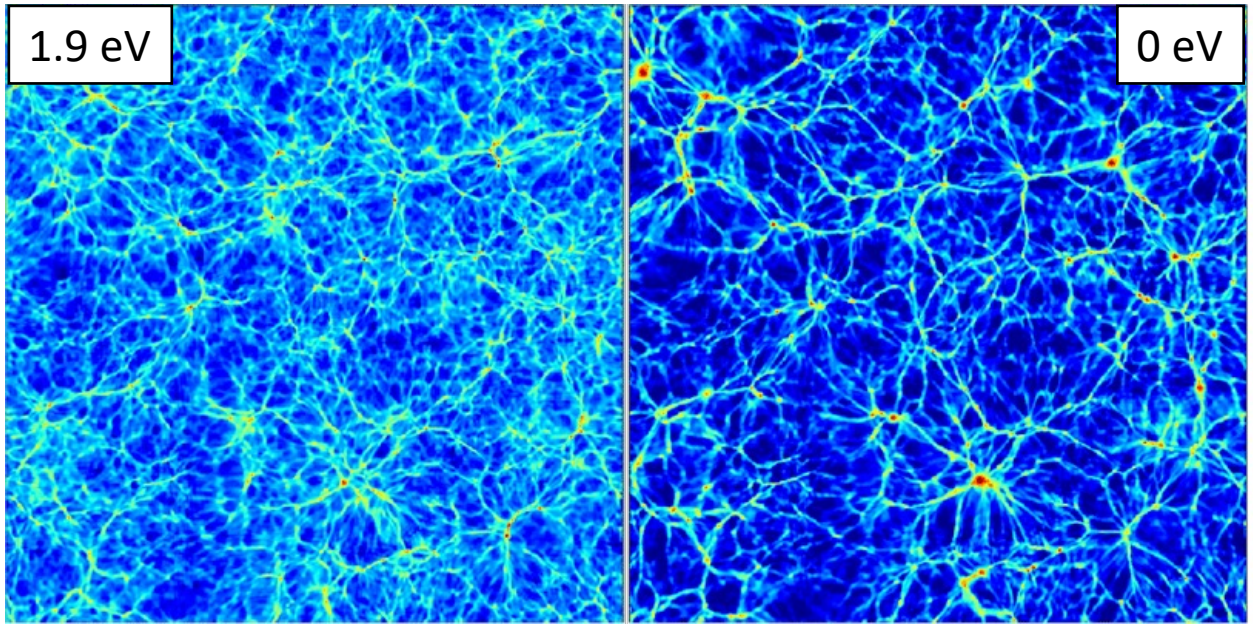


Model parameter inference (Carbone, Archidiacono)

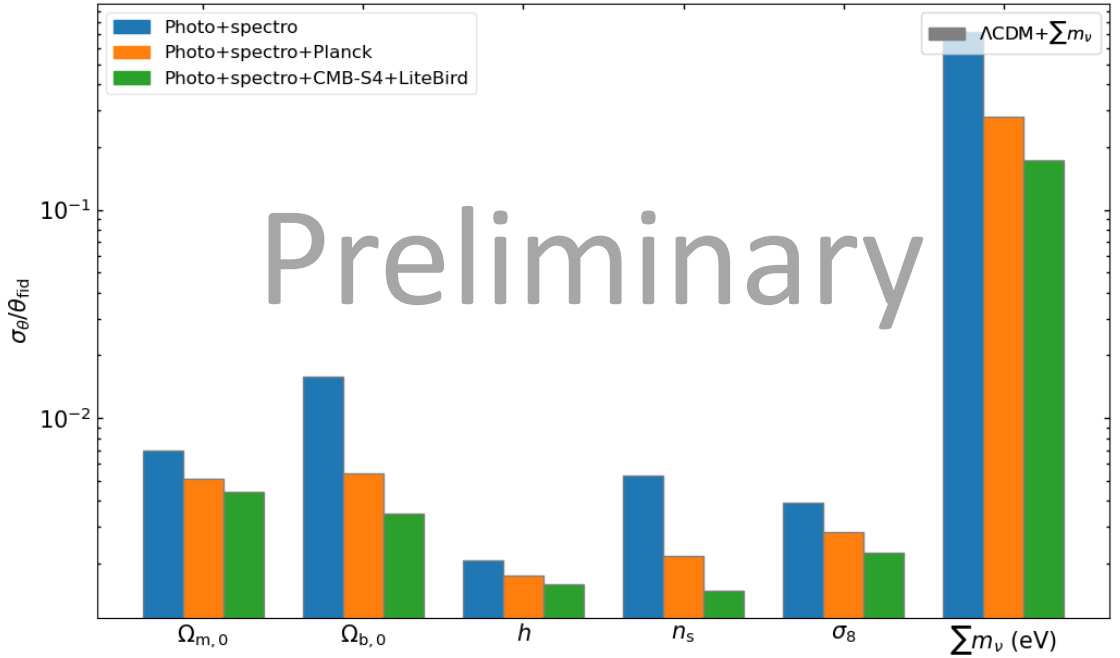
Cosmological inference

Euclid and “particle cosmology” @UniMI

Carbone - DEMNUni suite of n-body simulations in neutrino/ dark energy cosmologies



Neutrino forecast (WP3 of the TH-SWG, led by Maria Archidiacono and Julien Lesgourgues)

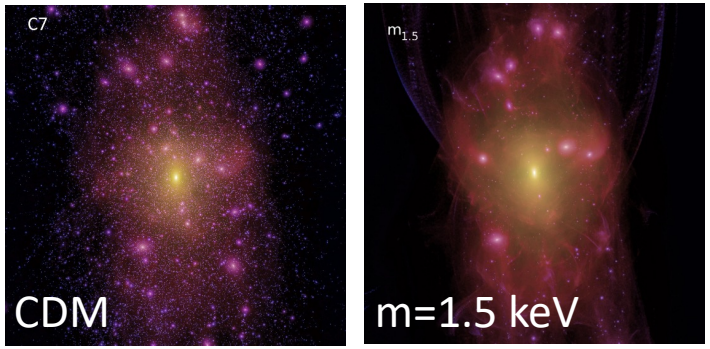


	$\Lambda\mathrm{CDM} + \sum m_\nu$					
	$\Omega_{m,0}$	$\Omega_{b,0}$	h	n_s	σ_8	$\sum m_\nu$(meV)
Euclid-only						
WL+GC_{ph}+XC_{ph}+GC_{sp}	0.0021865	0.00077348	0.001396	0.0050909	0.0031656	43.128
Euclid + CMB						
Euclid + Planck	0.0015981	0.00026652	0.0011844	0.0021014	0.0022841	16.876
Euclid + CMB-S4 + LiteBird	0.0013903	0.00017134	0.0010748	0.0014338	0.001824	10.365

Euclid and ”particle cosmology” @UniMI

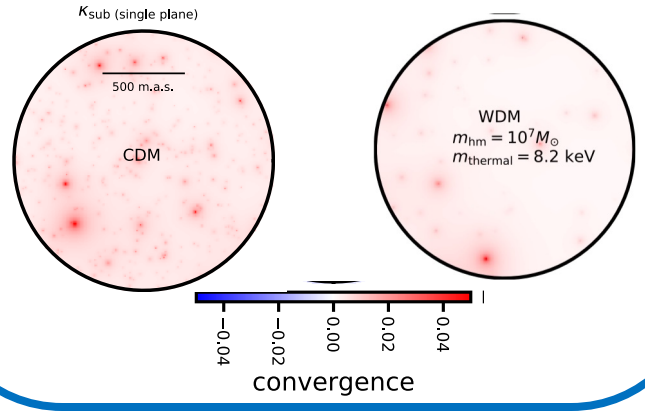
KeV sterile neutrinos

N-body simulations *Lovell+ 2014*



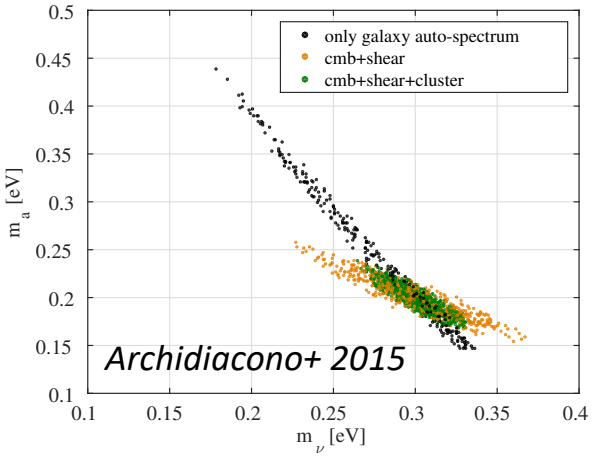
Strong gravitational lensing

Gilman+ 2019

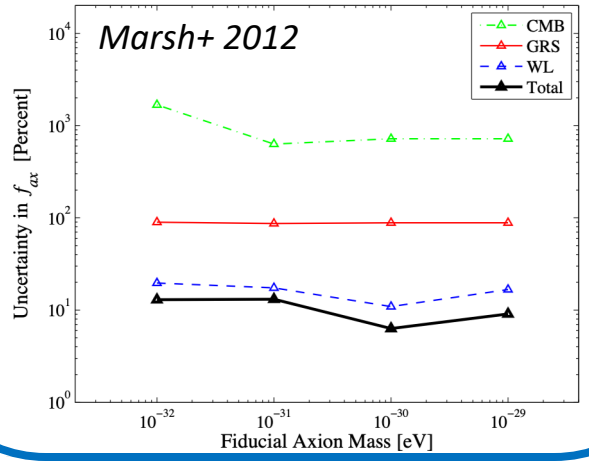


Axions

Thermal axions

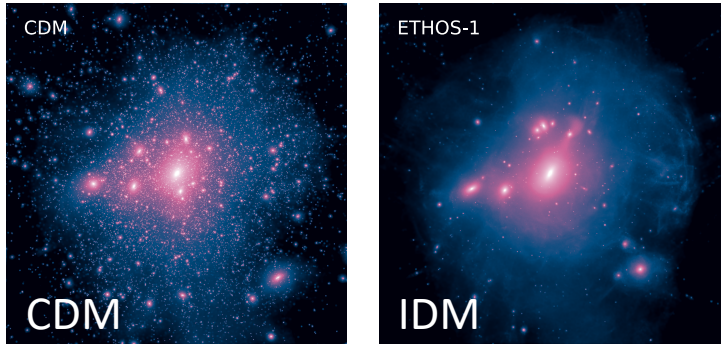


Ultra-light axions from strings

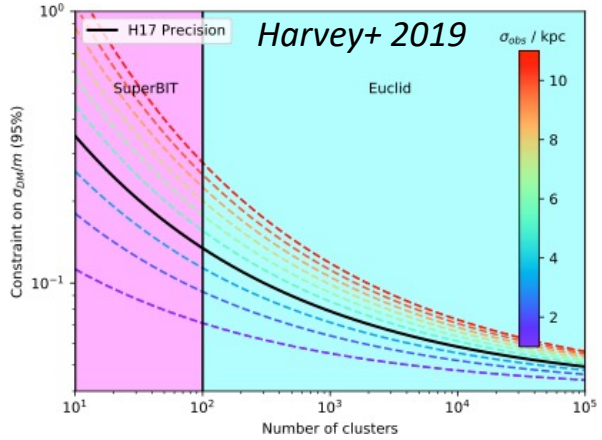


Self-interacting dark matter

N-body simulations *Vogelsberger+ 2016*



Galaxy clusters



Richiesta fondi

- ~5k (+2k) per missioni 2024
  - Interazione con gli altri nodi della sigla Euclid-INFN
  - Euclid Collaboration meeting
  - SWG meetings