The Euclid promise for galaxy evolution studies

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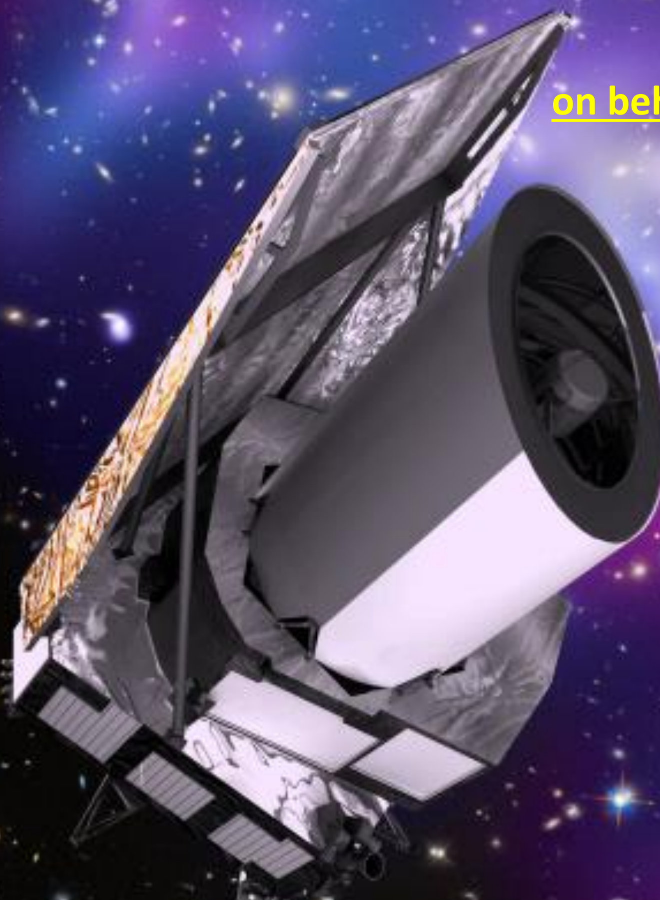
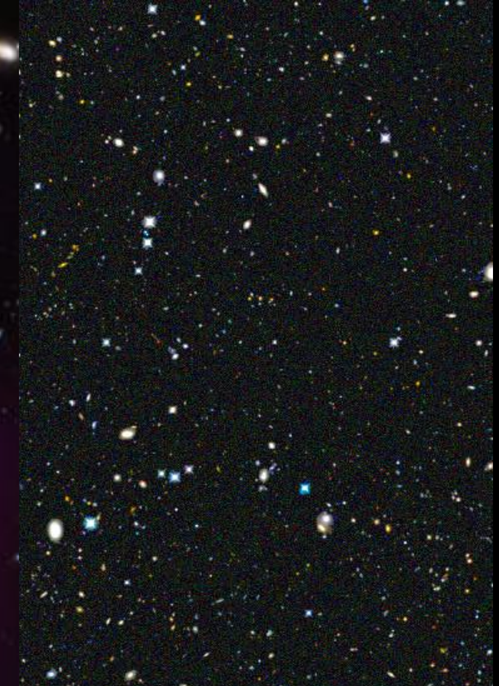
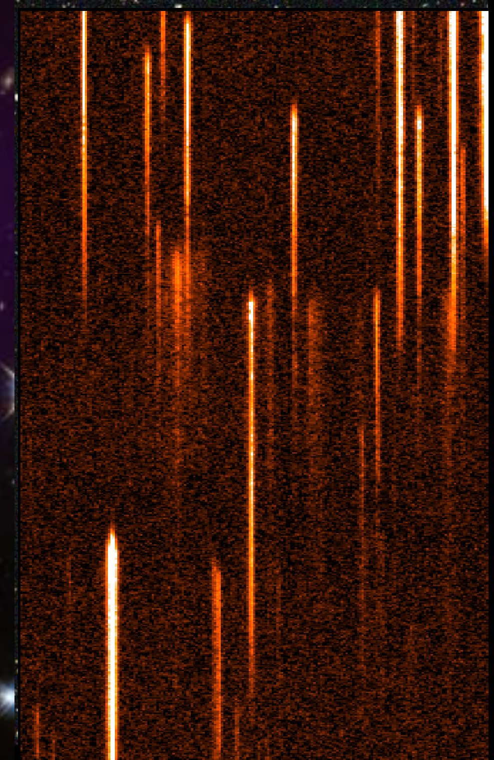
University of Bologna

on behalf of the Euclid Consortium



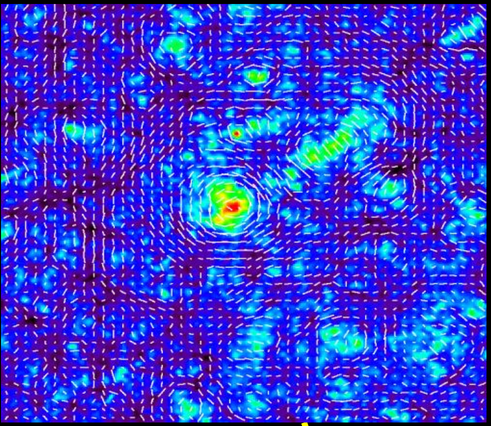




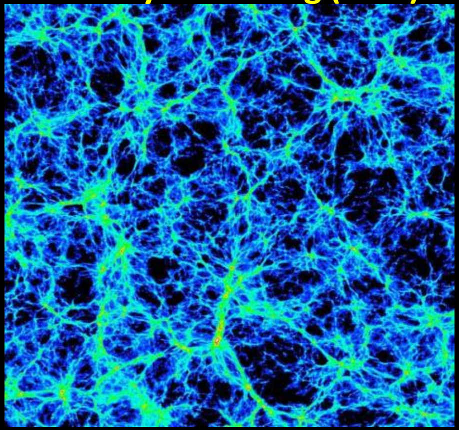
Back at the Edge of the Universe – Sintra, 17 March 2015

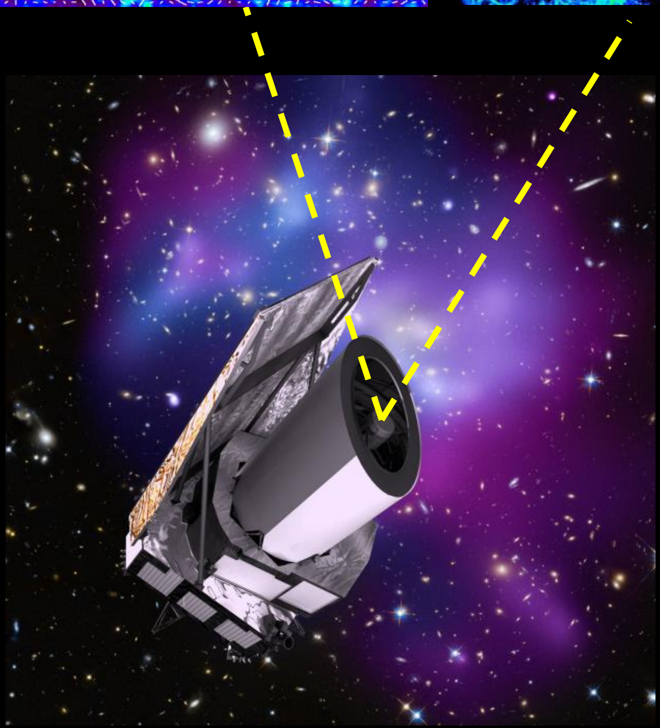
The Euclid Mission

Weak Lensing



Galaxy Clustering (BAO)



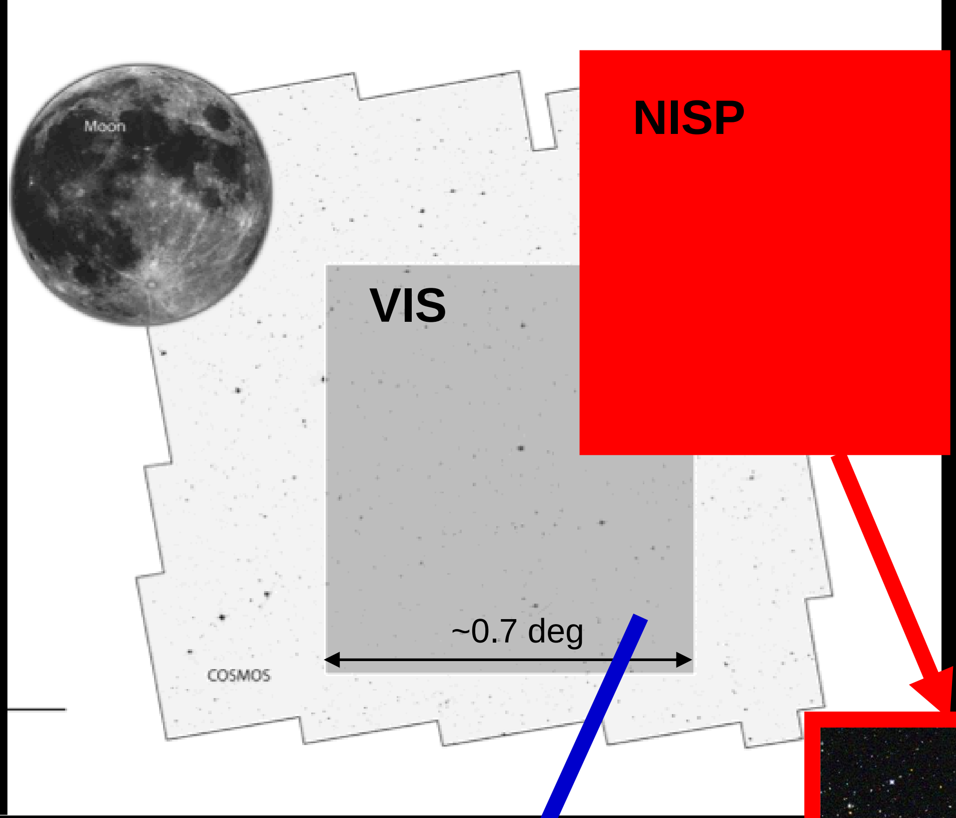


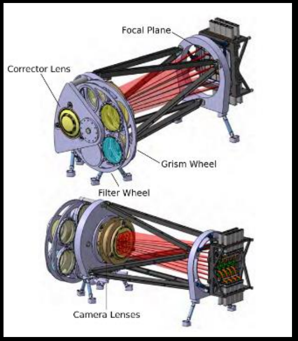
- ESA *Cosmic Vision 2015-2025*
- Medium-class mission
- Main driver : dark energy (WL & BAO)
- Launch in 2020

- L2 Orbit
- Mission duration ~ 6 year
- Telescope: 1.2 m diameter
- 2 instruments (visible & near-infrared)

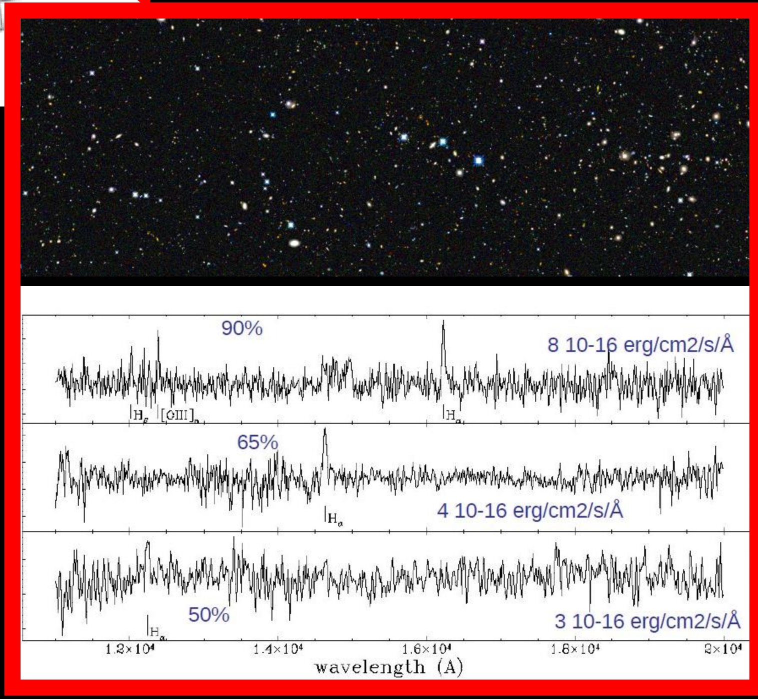
- Partners: ESA + Euclid Consortium + NASA + Industries

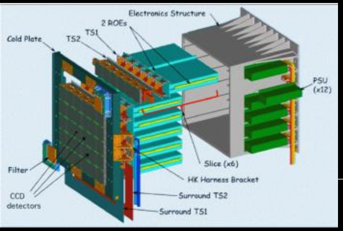
Laureijs et al. 2011 (arXiv:1110.3193)



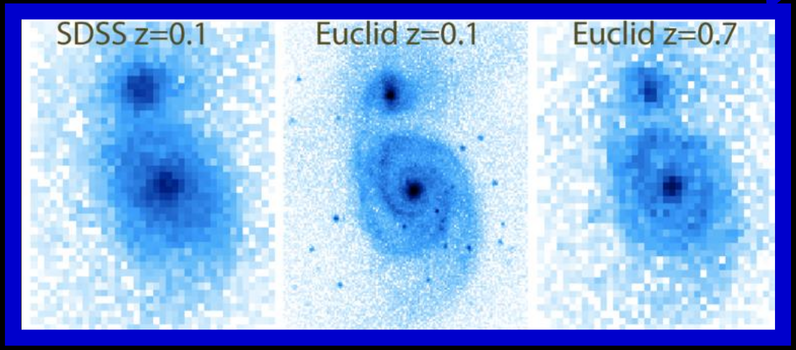


FoV=0.55 deg^2,16 detectors, 0.3'' pixel
YJH maging + slitless spectroscopy

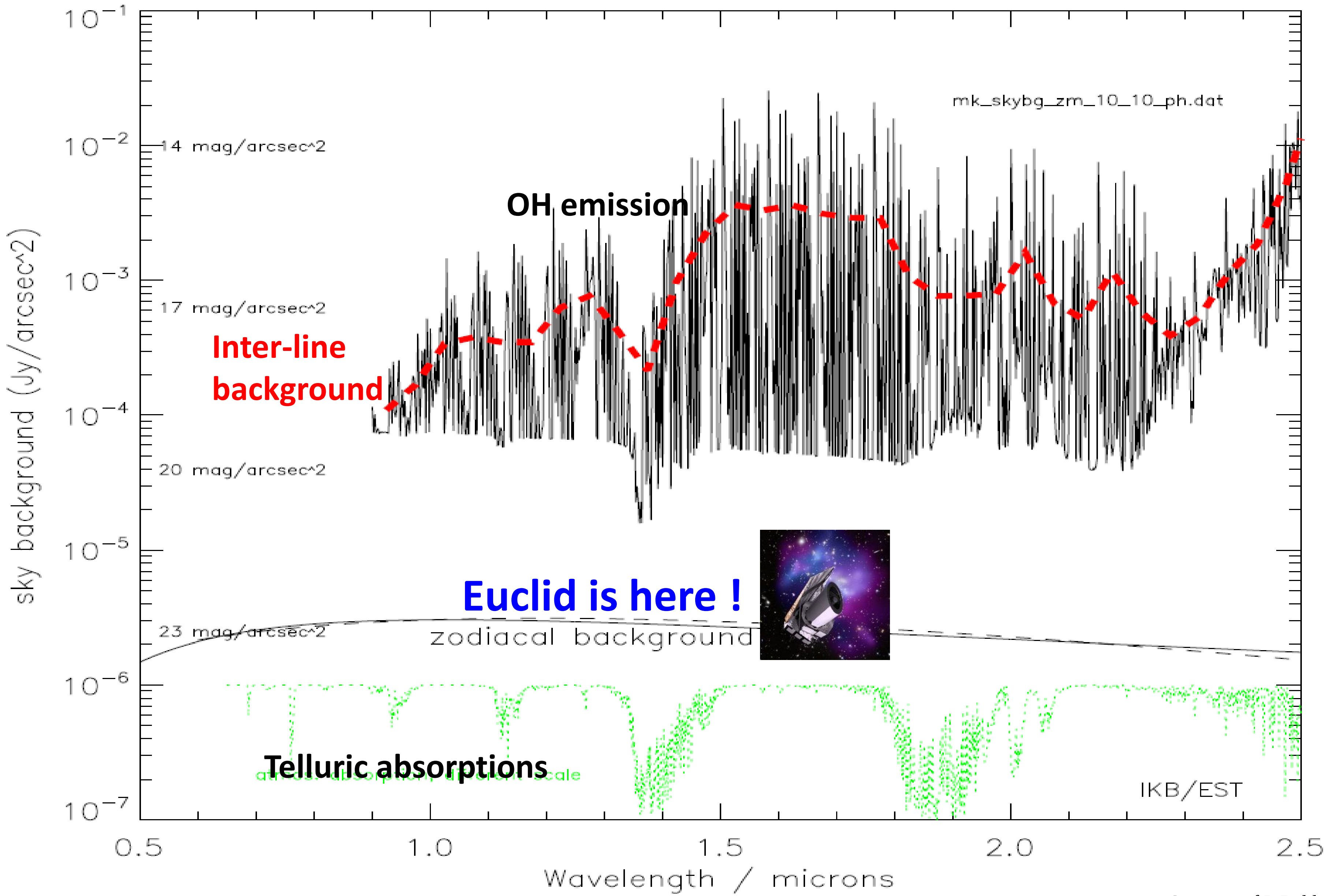




High-resolution imaging, 36 CCDs, 0.1'' pixel
FoV=0.55 deg^2, RIZ filter (0.55-0.92 μm)

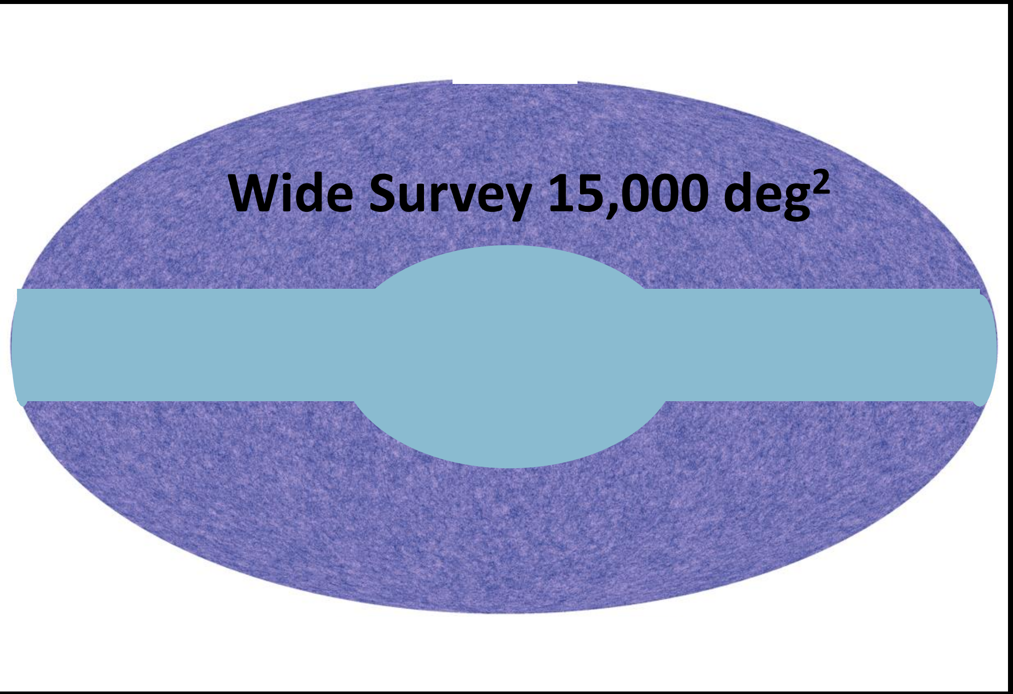


The advantage of space observations in near-IR



Courtesy of I. Baldry

The Euclid Surveys



SFR(Hα) > 10, 60 $M_{\odot} yr^{-1}$ @z= 0.9, 1.8
H<24: M* > 10^9, 10^{10} $M_{\odot}$ @z=1, 2

Up to 40 million Hα @0.9<z<1.8
Up to 7 million [O III] @1.5<z<2.7

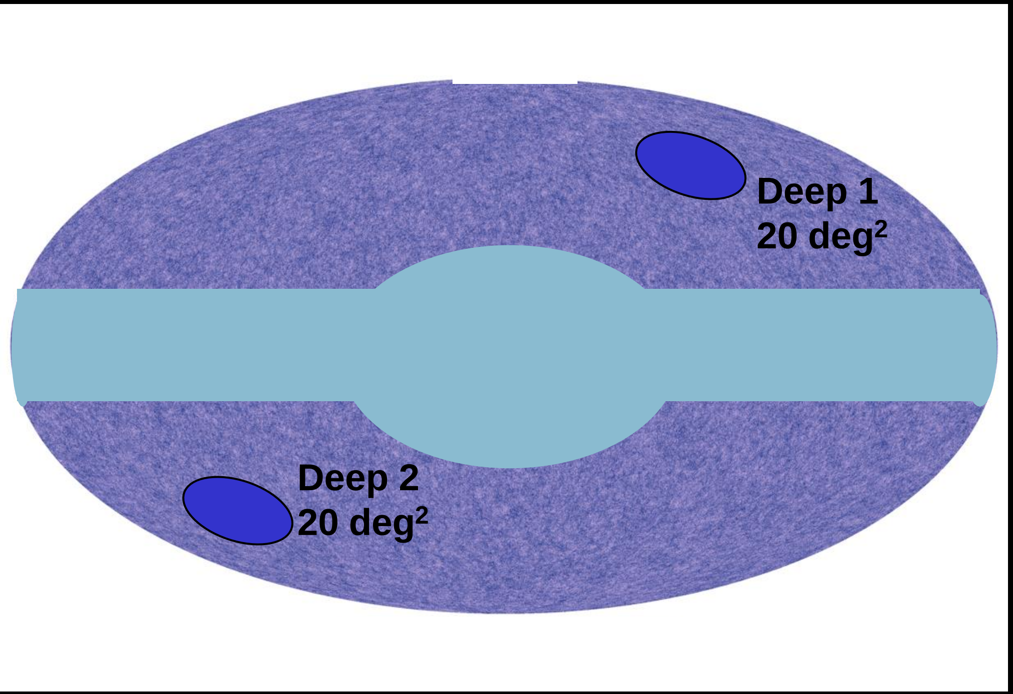
Wide Survey

IMAGING
- 4 dithers
- AB=24.5 (VIS), AB=24.0 (NISP)
- 2 billion galaxies
- High-resolution images (optical)
- Photometry (YJH)

SLITLESS SPECTROSCOPY
- 1.25 – 1.85 µm (R ~300)
- 4 dithers
- 3 P.A. of dispersion axis
- F(line)>2x10^{-16} ergs cm^{-2} s^{-1}
- H_{AB}<19.5 (continuum)

EXTERNAL DATA (imaging for photo-z)

The Euclid Surveys



Deep Survey (TBD)

IMAGING

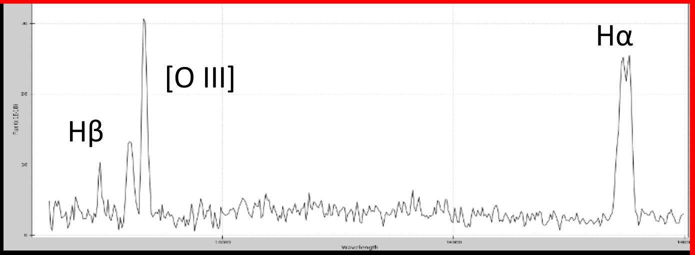
- AB=26.5 (VIS), AB=26.0 (NISP)

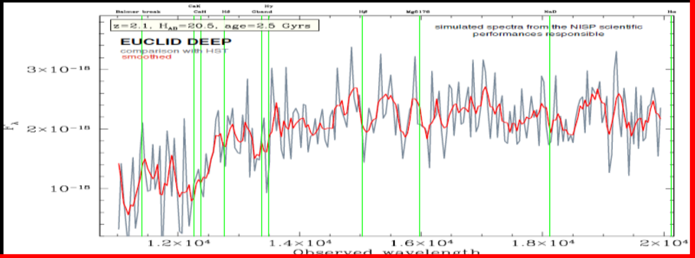
SLITLESS SPECTROSCOPY

- 0.92–1.30 μm (B) +1.25–1.85 μm (R)
- Several P.A. of dispersion axis
- F(line)>5-6x10^{-17} ergs cm^{-2} s^{-1}
- H_{AB}< 21.5 (continuum)

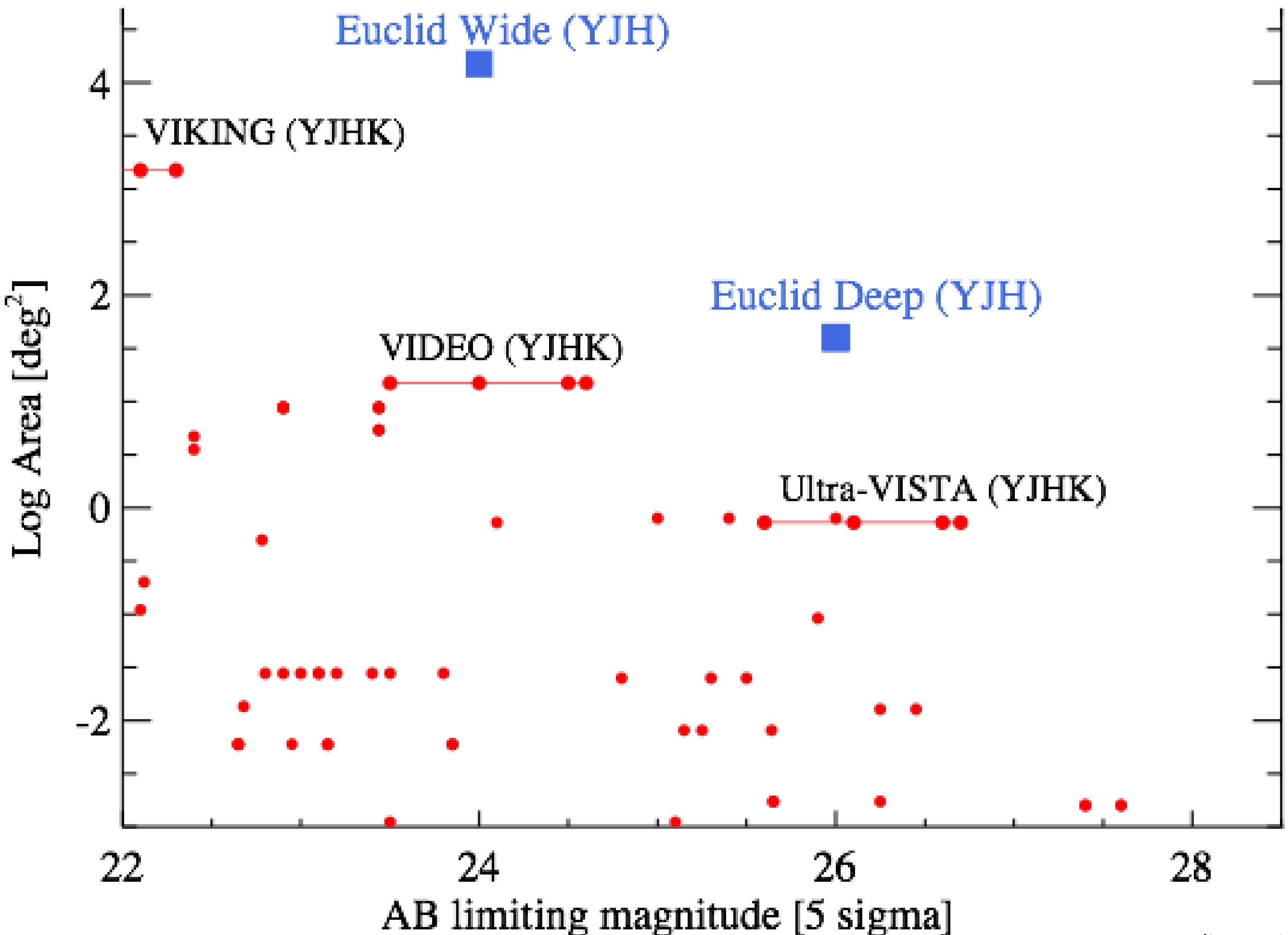
EXTERNAL DATA

1.7 million Hα	0.4<z<1.8
0.6 million [O III]	0.8<z<2.7
0.1 million Hβ+[O III]+Hα	0.4<z<1.8
0.6 million [O II]	1.5<z<4
10,000 passive ETGs	z>1.3
10,000 Balmer break	z>1.5
100 ? (40?) LAEs	**z>6.5 (7)**



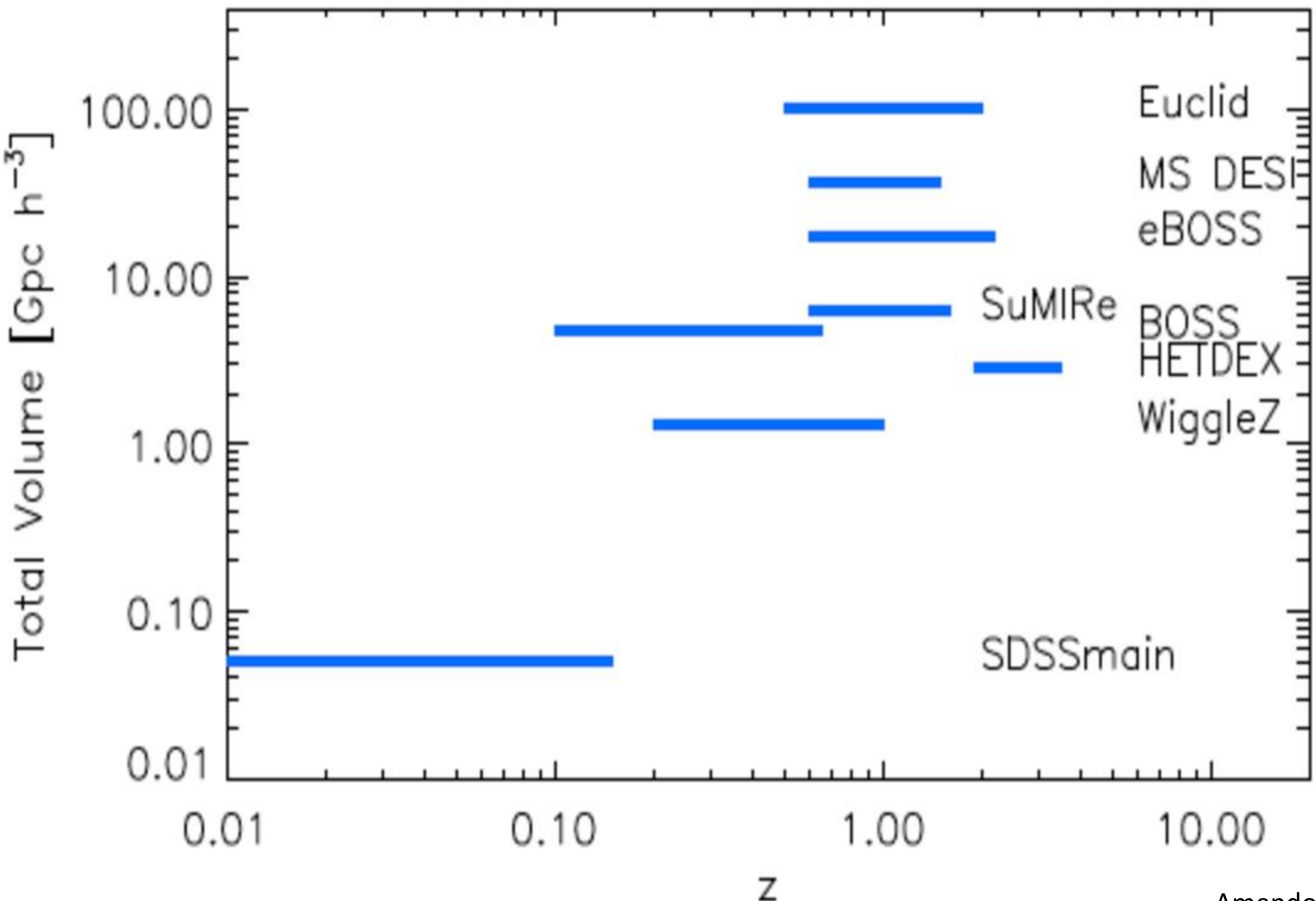


Euclid Near-IR Imaging Surveys (NISP)



credit: J. Brinchmann

Wide Survey – Spectroscopy



Amendola et al. 2013

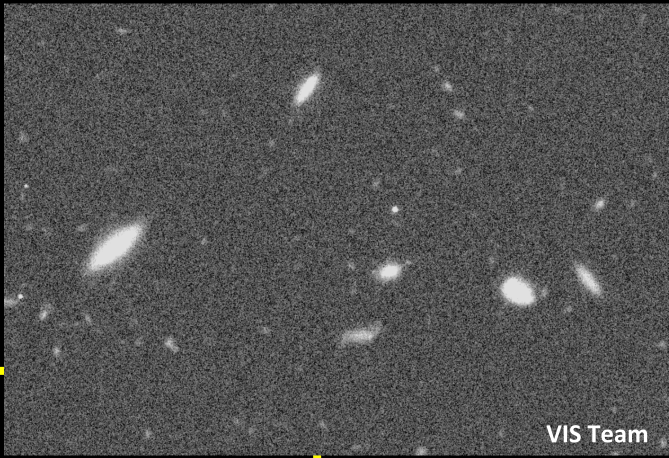
Euclid power

Survey

Timing and duration

Unfeasible from the ground

Unprecedented statistics



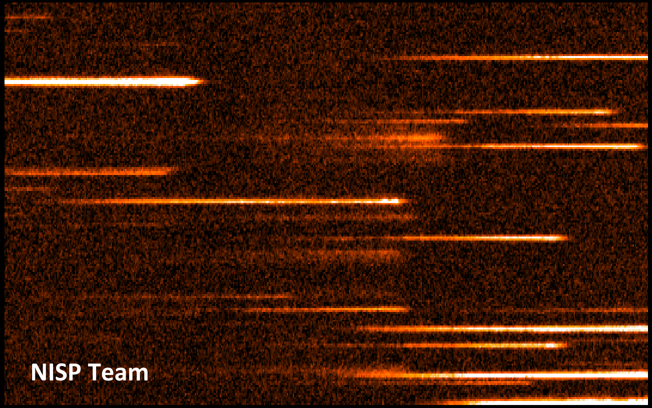
Data

Morphology + SED + photo-z or spec-z (+ spectrum)

Stability, homogeneity, accuracy, clean spectra

No target pre-selection

Most luminous / massive / rare objects



Combination with ground-based data

Complementary to NASA WFIRST-AFTA

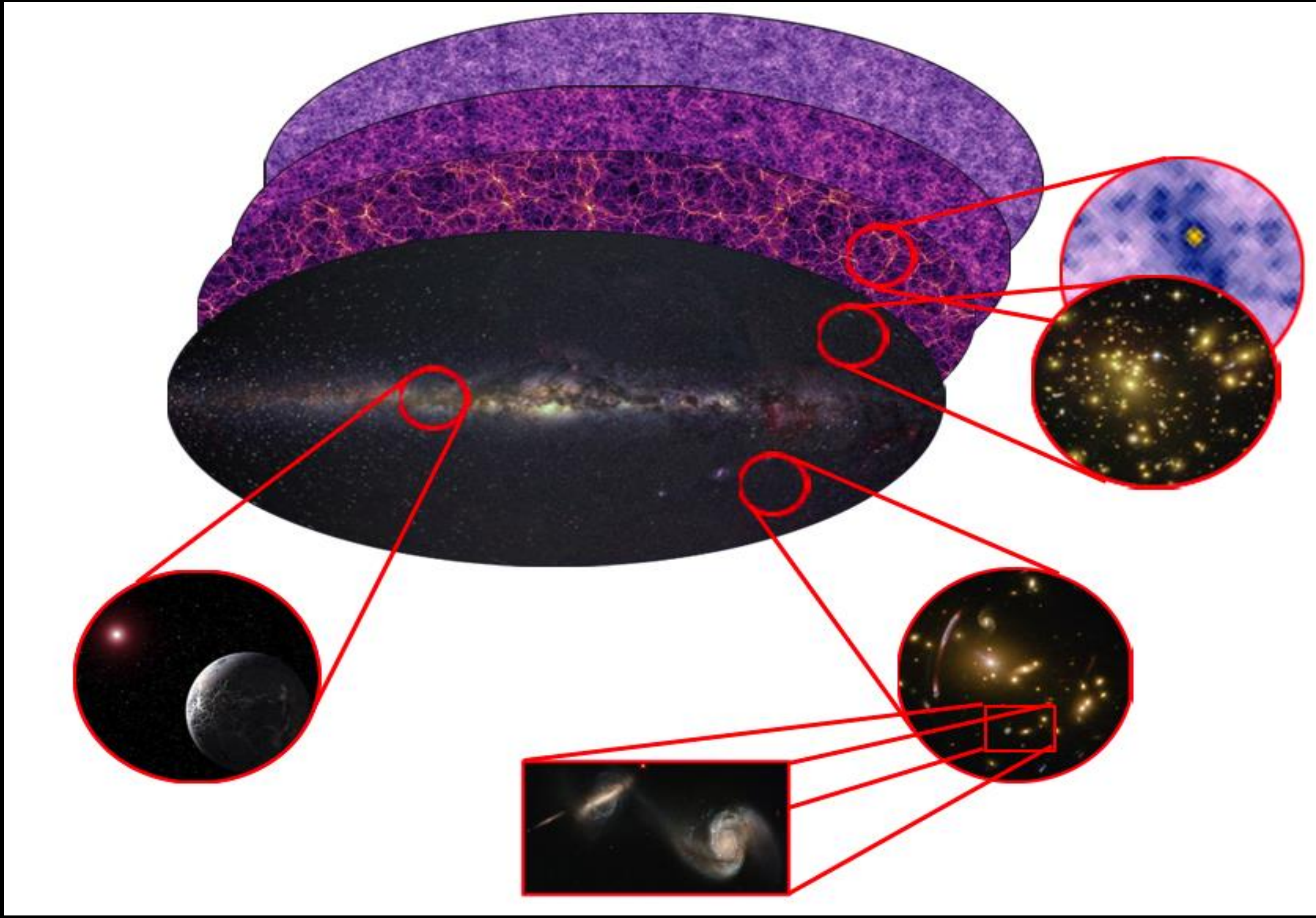
Relevant Science Working Groups in Euclid Consortium

SWG – GAEV (Galaxy Evolution) – J. Brinchmann, A. Cimatti, D. Elbaz

WP 1 (L. Pozzetti): **Photometry**
WP 2 (G. Cresci): **Spectra**
WP 3 (M. Magliocchetti): **Environment**
WP 4 (P.-A. Duc, C. Conselice): **Morphology**
WP 5 (M. Moresco): **Passive galaxies**
WP 6 (G. De Lucia): **Theoretical models**
WP 7 (S. Serjeant): **Lensing**
WP 8 (H. Aussel): **Multi-wavelength synergies**
WP 9 (S. Juneau): **Type 1 and 2 AGNs**
WP 10 (E. Daddi): **High-z objects (z<7)**
WP 11 (E. Zucca): **Distribution functions**

SWG – PU (Primordial Universe) – J.-G. Cuby, J. Fynbo

WP 1 (Cuby, Dunlop): **Survey design**
WP 2 (McLure): **Lyman-Break Galaxies**
WP 3 (Warren/McMahon): **QSOs**
WP 4 (Ferrara): **Intergalactic medium**
WP 5 (Kashlinsky): **Cosmic Infrared Background**
WP 6 (Cooray): **Lensing**



- *Gold mine* for galaxy evolution studies to z ~ 2+
- Synergies with multi-wavelength facilities
- Benchmark for theoretical models