Euclid Update
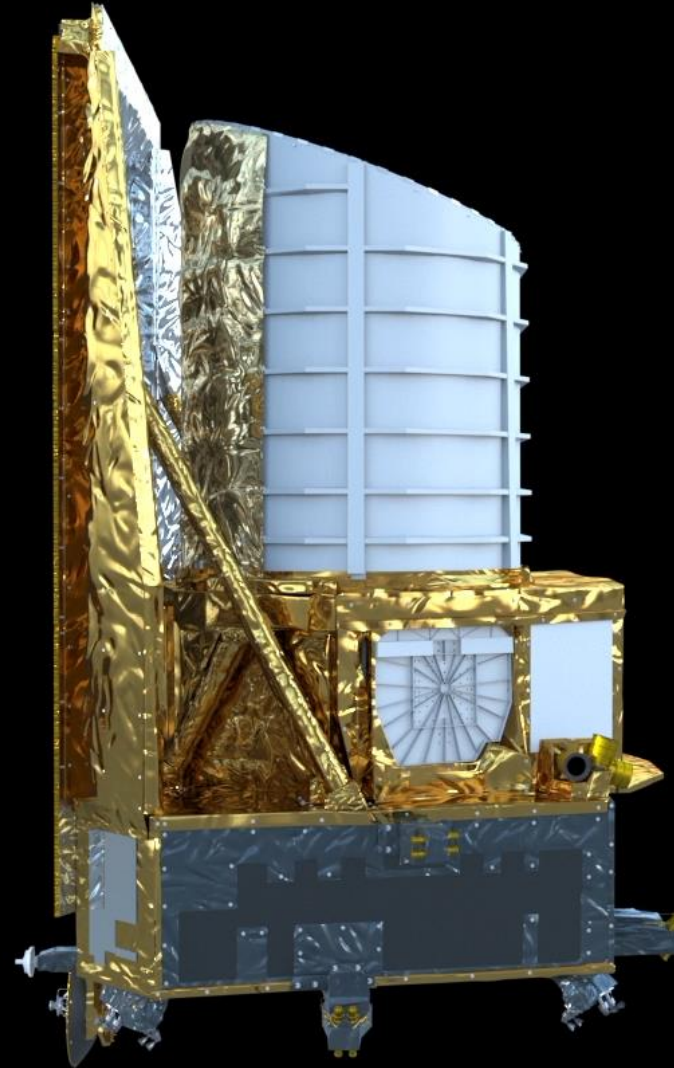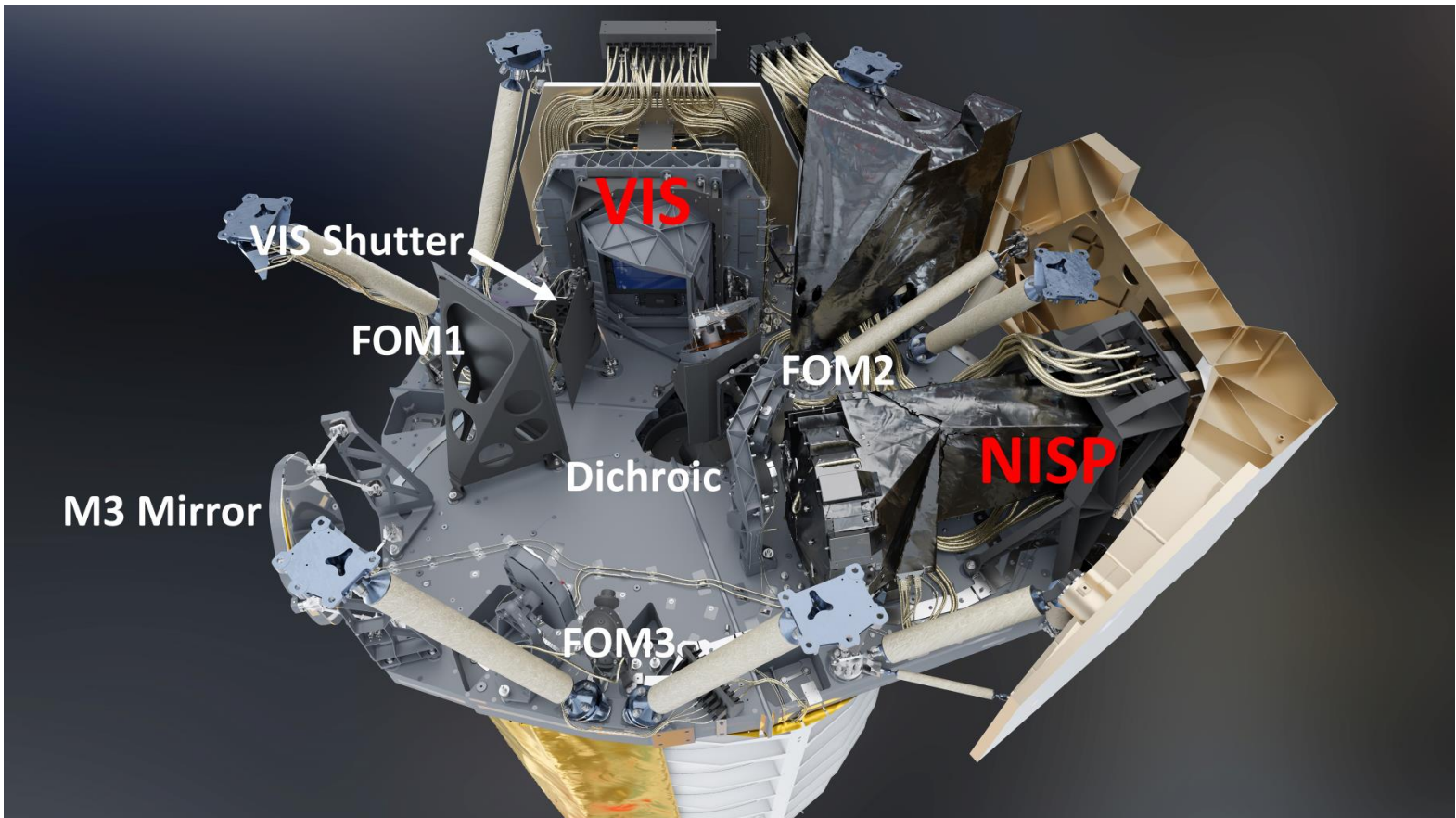

Jason Rhodes (Jet Propulsion Laboratory, California Institute of Technology)
April 2021
APS

VIS

VIS Shutter

FOM1

M3 Mirror

Dichroic

FOM2

NISP

FOM3

esa

euclid

NASA

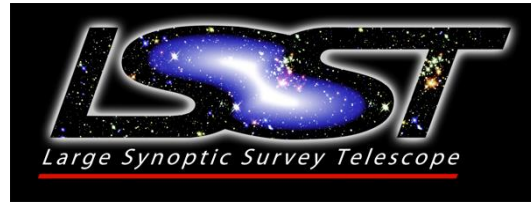| Near-Infrared Spectrometer and Photometer (NISP)	Visual Imager (VIS)
FOV: 0.78 x 0.73 deg 16 H2RGs 0.3" / pixel	**FOV:** 0.79 x 0.70 deg 36 4kx4k e2v CCDs 0.1" / pixel

Launch:
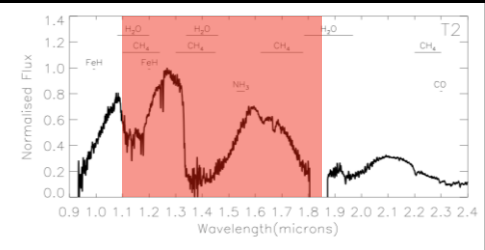on Soyuz from Kourou, Late 2022

Mission Lifetime:
6+ years @ L2

Aperture:
1.2m

Proposed lifetime	2022 - 2032	2022 - 2028	2025 - 2031
Mirror size (m)	6.5 (effective diameter)	1.2	2.4
Survey size (sq deg)	20,000	15,000	2,227
Median z (WL)	0.9	0.9	1.2
Depth (AB mag)	~27.5	~24.5	~27
FoV (sq deg)	9.6	0.5 (Vis) 0.5 (NIR)	0.28
Filters	u-g-r-i-z-y	Y-J-H-Vis	Y-J-H-F184
Cosmological probes	WL, LSS, SN	WL, LSS	WL, LSS, SN

Euclid legacy science - some examples

Niall Deacon, Bianca Garilli, Paolo Franzetti

Cool brown dwarfs - both in spectroscopy and imaging

Euclid NIR imaging: detection of giant branch stars out of 5 Mpc - streams, galaxy halos

2-3 orders of magnitude more strong galaxy lenses than before Euclid (1.5 SLACS/week)
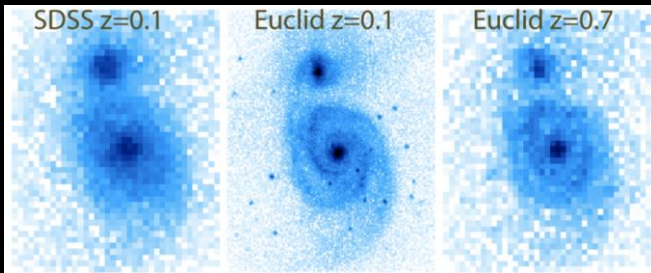
Galaxy morphologies across the whole extragalactic sky ($>10^3$xHST)
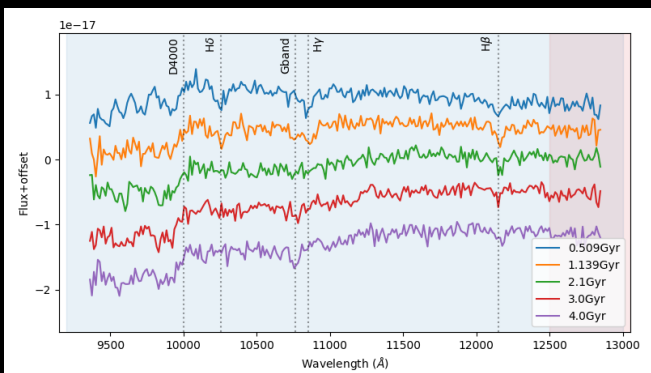
Rare objects galore - massive, passive galaxies with spectra to H~23, the brightest z>7 Ly-a emitters, ...

Euclid will find the sources to follow-up for years to come

What	Euclid	Per deg^2
Galaxies at 1<z<3 with good mass estimates and morph.	~2x10^8	~10^4
Massive galaxies (1<z<3) w/spectra	~few x 10^3	~0.2
Hα emitters/metal abundance at z~2-3	~4x10^7/10^5	~10^3/~10
Galaxies in massive clusters at z>1	~(2-4)x10^4	~40 (per cluster, H$_{AB}$<22.5)
Type 2 AGN (0.7<z<2)	~10^4	<1
Galaxy mergers	~10^5-few x 10^6	1-100
Strongly lensed galaxy-scale lenses	~200,000	1-10
z > 7 Ly-a emitters	~few 10^3	<<1
Resolved stellar populations	~13? with M$_{abs}$ < -19	<<1

courtesy Tranin, Cimatti, Moresco, Pozzetti, Ealet, Zoubian et al

Remaining activities to launch & commissioning
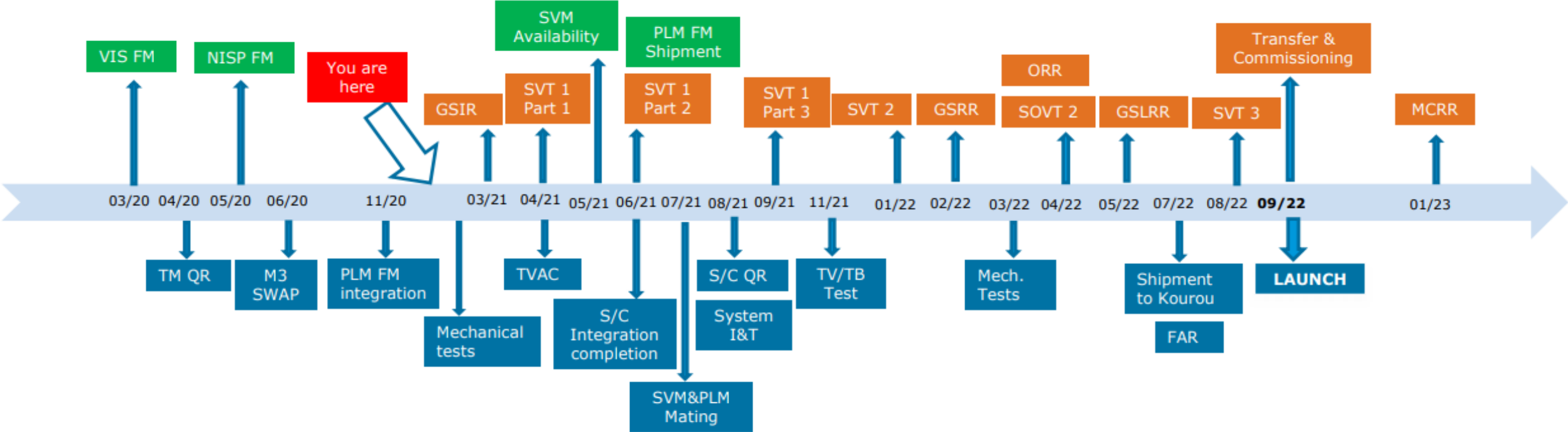
Euclid Science Team meeting #27 |Project Status, G.D.Racca | WebConference 27/01/2021 | Slide 3

ENSCI

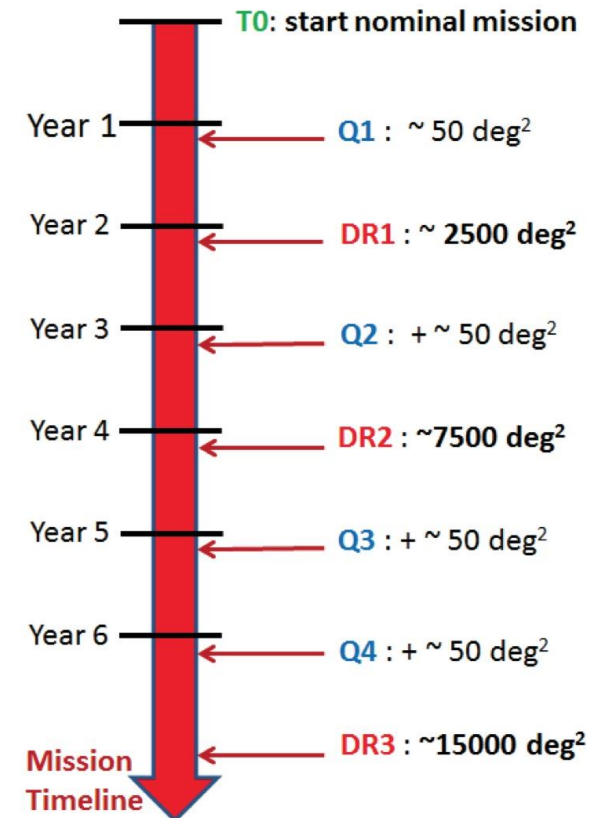- NASA has established the Euclid NASA Science Center at IPAC (ENSCI) in order to support US-based investigations using Euclid data.

- ENSCI primary tasks:
  - T1: US Community Support
  - T2: Detector Characterization Data Archive
  - T3: Contribute/Gain expertise in pipelines
    - Participation in NISP algorithm/software design and high level calibration tasks
    - Develop production software in our role as SDC-US-Dev
  - T4: Establish and operate SDC-US [production side]
    - data processing, storage, and access
    - Node in distributed processing system
  - T5: Work closely with SOC on Data Quick Look Analysis (DQLA)
    - Gain insight into operations, advocate for US community needs
  - T6: Mission Verification working group
    - Insight into the big picture of science mission design

- For more details, see http://euclid.caltech.edu

ENSCI and the US Community

- ENSCI work pre-launch will prepare us to support US community research
  - Presence at IPAC booth at AAS
  - Website and Helpdesk
  - User Panel (starting 1 year before launch)

- Science potential of archive is enormous
  - Imaging at 0.1-0.3" pixels, ~24mag Vis, Y, J, H over 15,000 deg^2
  - >2B galaxy photo-z; ~50M grism redshifts
  - ~1000 multiply-imaged QSO and ~300K strongly lensed galaxies

- Expect a flood of proposals after first public data release
  - Spitzer and WISE were each ~40% of ADAP in their first year

T0: start nominal mission

Year 1 — Q1 : ~ 50 deg^2

Year 2 — DR1 : ~ 2500 deg^2

Year 3 — Q2 : + ~ 50 deg^2

Year 4 — DR2 : ~7500 deg^2

Year 5 — Q3 : + ~ 50 deg^2

Year 6 — Q4 : + ~ 50 deg^2

Mission Timeline — DR3 : ~15000 deg^2

Euclid Structures- how to join

- Euclid Consortium (EC) >1500 members
  - About 100 from US
  - ~10 science working groups
  - Possible to join: compelling contribution to Euclid, support of science working group lead(s), sufficient funding to cover engagement

- Euclid Consortium Board (ECB), ~ 20 member governing body of EC appointed by
  - Jason.d.rhodes@jpl.nasa.gov is US rep

- ESA Euclid Science Team (EST), 13 member ESA body that 'safeguards' science requirements, ensures mission success, defines additional surveys
  - Jason.d.rhodes@jpl.nasa.gov is US rep

- Thoughts, ideas, questions, please contact Jason