# Report to ECB

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Heidelberg

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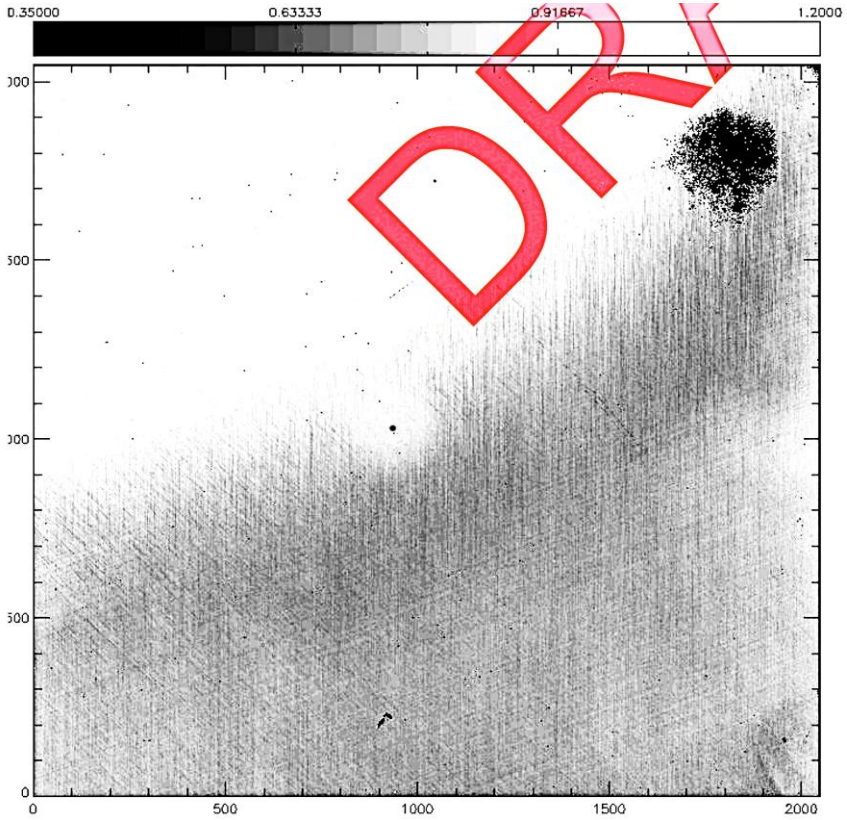
# H2RG sub-pixel response testing at JPL

- An engineering grade H2RG detector was moved to JPL's Precision Projector Laboratory (PPL) to characterize the cross-hatch pattern seen in flats.
- Pattern is likely related to crystal structure of HgCdTe. Ridges have been seen in microscope images of JWST detectors.
- PPL will scan a grid of Euclid-like point sources over most of the detector to analyze sub-pixel effects on photometry (possibly astrometry).
- **<u>STATUS</u>**: Machining minor hardware to accommodate H2RG package in PPL dewar. Preparing analysis pipeline using PPL's older (pre-JWST) H2RG. Start of testing expected on Feb 1.




920nm quantum efficiency (flat) for H2RG **#18546** from 2016-07-06. Contrast adjusted to show cross-hatching

# Detector Integration

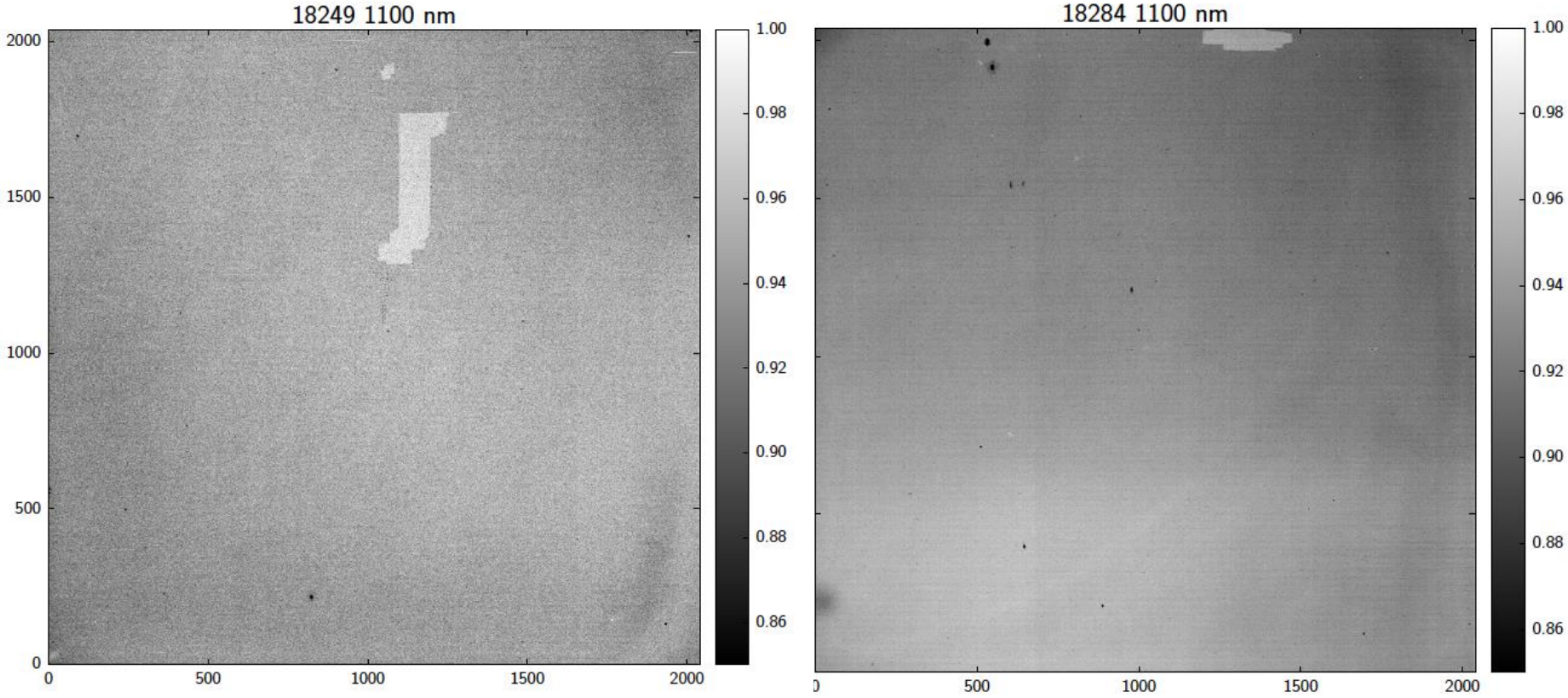
- NASA Project Scientist (Mike Seiffert) leading the recommendation for selection of flight detectors (16 flight + 4 flight spares) from larger pool of approximately 25 flight quality candidates.
  - Using a Figure-of-Merit (FoM) approach that expresses the S/N achievable with each SCA weighted by the typical observations anticipated in the Euclid wide survey.
  - Evaluation based on characterization data gathered at the GSFC Detector Characterization Lab and archived at the Euclid NASA Science Center at IPAC.
  - Closely coordinated with ESA and the EC through in-person meetings and telecons of the Detector Working Group. Supplemented by direct work and data exchange with the NISP Detector Scientist Rémi Barbier.

- Flight candidate SCAs are then ranked according to the FoM.
- After consideration of other factors (e.g. quality assurance, schedule) top candidates are then selected for integration into SCS assemblies for further testing and eventual delivery to ESA.

# Detector Integration – cont'd

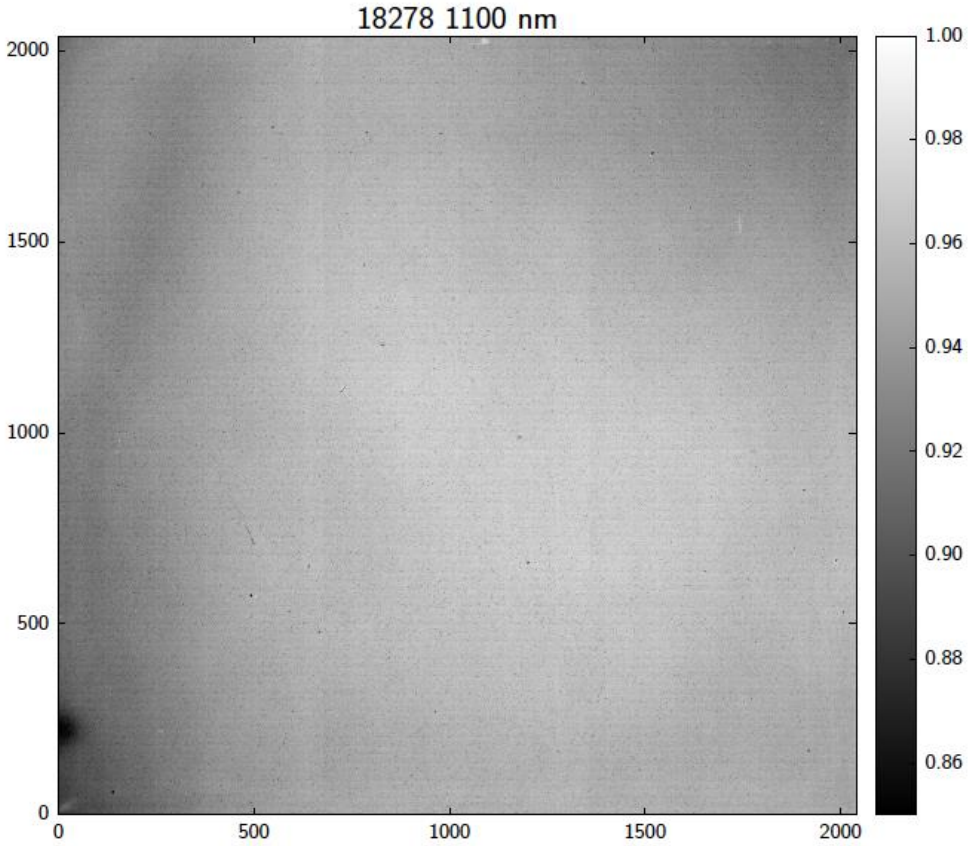
- **Despite considerable attention on non-ideal aspects of detector performance, *the Figure of Merit for selected flight detectors is much better than a uniform detector at the level of the requirment!***
- **First four detectors have been selected for flight.**

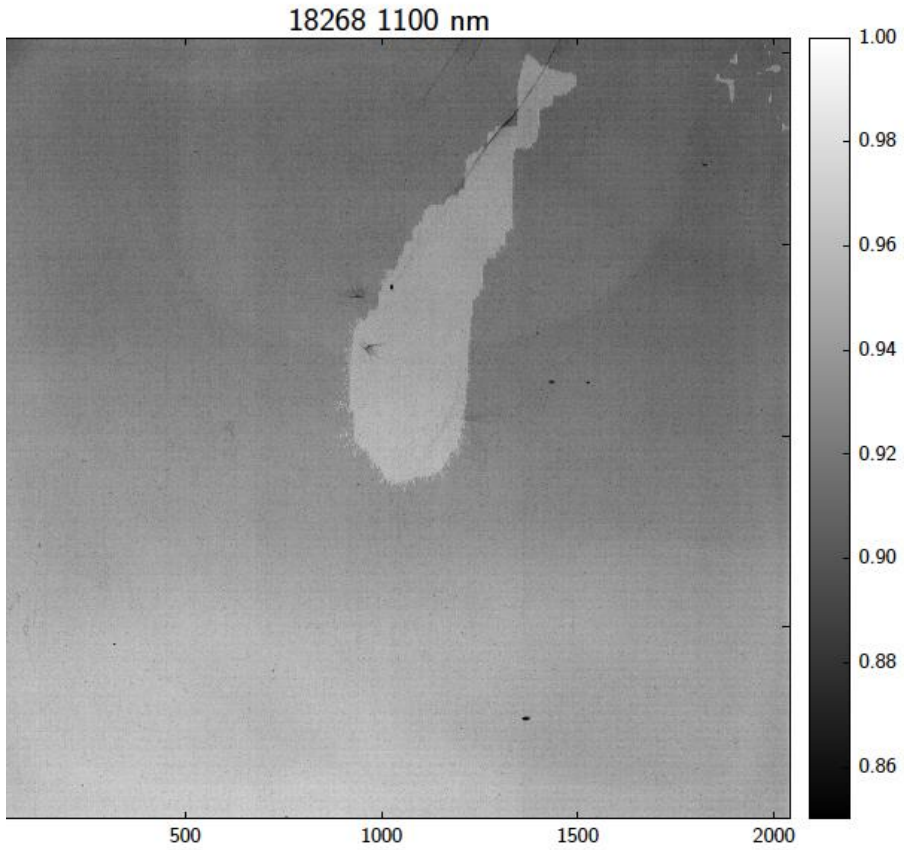
First four flight SCAs - QE



# Detector Integration – cont'd

First four flight SCAs – QE, cont'd



# Detector Procurement

25 flight candidate SCAs have been delivered to JPL. this completes the SCA procurement. the SCA is the sensor chip assembly or HAWAII 2 RG IR detector array.

6 flight candidate SCEs have been delivered to JPL. (this will be true on monday). SCE is the sensor chip electronics which includes the SIDECAR ASIC

1 engineering unit SCA (18281) was shipped to ESTEC in December and is available for cross hatch testing.

1 engineering unit SCS (SCA 18273, cable and SCE FA005) will be shipped to CPPM on Feb 23.

the first SCS started on 1/27. this includes 4 full flight triplets. a triplet is an SCA, cable and SCE.

# LSST/Euclid coordination

- Requires international agreements and careful examination of data rights
- Requires agreement of Euclid Consortium, LSST Project and LSST DESC
- Previous attempts at coordination have not yet reached an agreement on what would be shared, how it would be shared, and when it would be shared
  - Both projects have data they do not want to share immediately without safeguarding their core science
- Euclid Consortium, LSST DESC, LSST Project produced a joint charge that led to an in-person meeting of key scientists in July 2015

# LSST/Euclid White paper

- One day meeting organized by Rhodes in July 2016 in Oxford, UK
- ~20 participants from Euclid and LSST (many in both)
- Agreed to write a white paper that did not concern itself with the politics of data sharing or cadence coordination
- White paper has progressed in fits and starts since July, but expect a compete draft by end of February
- Plan to publish white paper in a refereed journal for use as a guide for future MOU discussions. Outline:
    1. Conceptual Rationale
    2. Benefits for Cosmology
    3. Benefits for Other Science (solar system, galaxy clusters, etc)
    4. Technical aspects of Coordination (shear, photometric redshifts, etc)
    5. Implementation Plan
    6. Gap Analysis/Resources Needed
    7. Summary

**Attendees:**
Mario Juric
Andy Connolly
Steve Kahn
Ian Shipsey
Robert Lupton
Jean Charles Cuillandre
Marc Sauvage
Bob Nichol
Tom Kitching
Rachel Bean
Anja von der Linden
Peter Capak
Richard Massey
Jason Rhodes
Andy Taylor
Will Percival
Dominique Boutigny
Eric Aubourg
Hendrik Hildebrandt
Rachel Mandelbaum
Jeff Newman

# LSST/Euclid White paper

- Has been going slow, progress only made when I really push people
- **Could use help in pushing specific people to deliver**
- Euclid side has been slightly better at meeting deadlines than LSST side
- Next in person meeting is Feb 15 at DESC meeting
- Hope to have a nearly final draft by end of February
- Will be circulated first to ECB and LSST leadership
- Needs to be publicly released (arxiv?)
- Need to decide if sufficient new ‘science’ to publish in a peer reviewed journal

# WFIRST-AFTA

- **Highest Priority**
- **#1 Large-Scale Priority - Dark Energy**
- **#1 Medium-Scale Priority - New World Development**
- **(prepare for 2020s planet imaging mis**

- Latest Design Reference Mission is WFIRST (Astrophysics Focused Telescope Asset)
- AFTA is a repurposed 2.4 m telescope from Reconnaissance office (NRO)
- The AFTA telescope is already built, and sit facility
- WFIRST-AFTA includes a coronagraph to i
- This was not envisaged by the decadal surve
- Enabled by the 2.4 telescope

Harris Corporation / TJT Photography

# Status

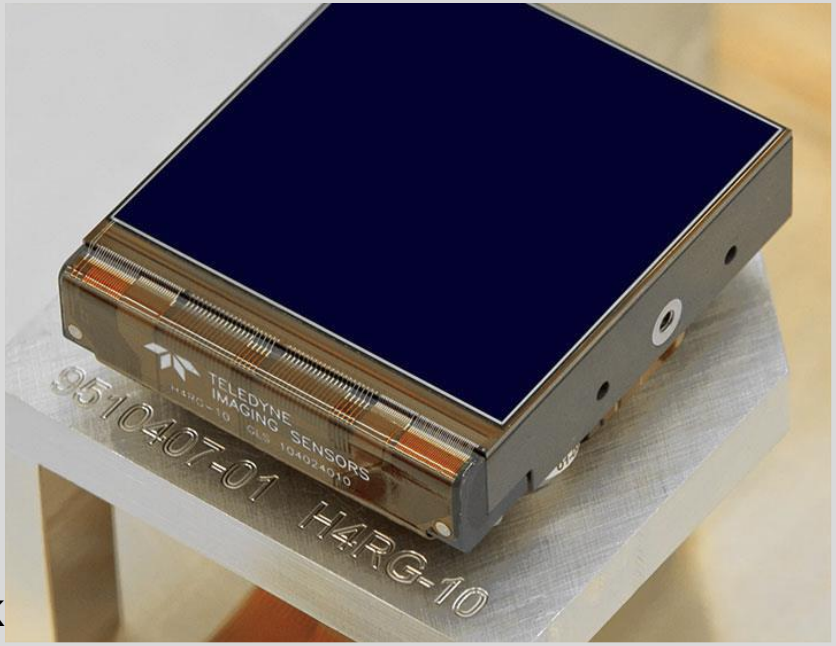
WFIRST moving forward – Phase A entered in 2016

- Funding:
  - $203M in FY14-16
  - $120M in FY17 (Senate)
  - Detector, coronagraph development
  - On track for TRL-6 in 2017
- 2025 Launch for a 6 year primary mission
- Formulation Science Working Group selected and active

- Instrument meetings:
  - CGI Meeting Dec 7, 2016 in Pasadena
  - WFI Meeting Jan 12, 2016 in New York

- Science meetings
  - AAS Special Session January 5, 2017
  - WFIRST conference June 26-30, 2017

H4RG 10 micron device



# WIRST FSWG

Neil Gehrels GSFC Project Scientist, **Chair**
Jeremy Kasdin Princeton U. CGI Adjutant Scientist, Co-Chair
David Spergel Princeton U. WFI Adjutant Scientist, Co-Chair

**SCIENCE TEAM PIs**

**Olivier Doré JPL Weak Lensing, Redshift Survey**
**Ryan Foley UCSC Supernovae**
Scott Gaudi Ohio State U. Microlensing
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Bruce Macintosh Stanford U. Coronagraph
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James Rhoads Arizona State U. GO, Cosmic Dawn
Brant Robertson UC Santa Cruz GO, Extragalactic Science
Alexander Szalay Johns Hopkins U. GI, Archival Science
Margaret Turnbull SETI Institute Coronagraph
Benjamin Williams U. Washington GO, Nearby Galaxies

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David Weinberg Ohio State U. Weak Lensing, Redshift Survey

**INTERNATIONAL OBSERVERS**

Anthony Boccaletti ESA Representative
Jean Dupuis CSA Representative
Thomas Henning ESA Representative
Toru Yamada JAXA Representative

# WFIRST and the new administration

## JASON's VIEWS (not official NASA)

- A lot of uncertainty at NASA now overall as we do not have an administrator
  - Administrator is a political appointee.
  - Sometimes asked to stay on during transition
  - New president asked/caused many people to leave positions rather than stay on
- Euclid is nearly 'done' at NASA and wont be affected
- WFIRST has had bipartisan support in both houses of Congress
  - Top supporter in lower house remains
  - Top supporter in upper house has retired
- Some uncertainty, but I think WFIRST will continue
- Cost growth, especially over the next year in Phase A, is the primary concern
  - NASA and the Project must be vigilant about real or perceived cost growth