Detectors for Astrophysics, Space, and Extreme Environments

Queen Mary University of London | Est. 1785

PSD14

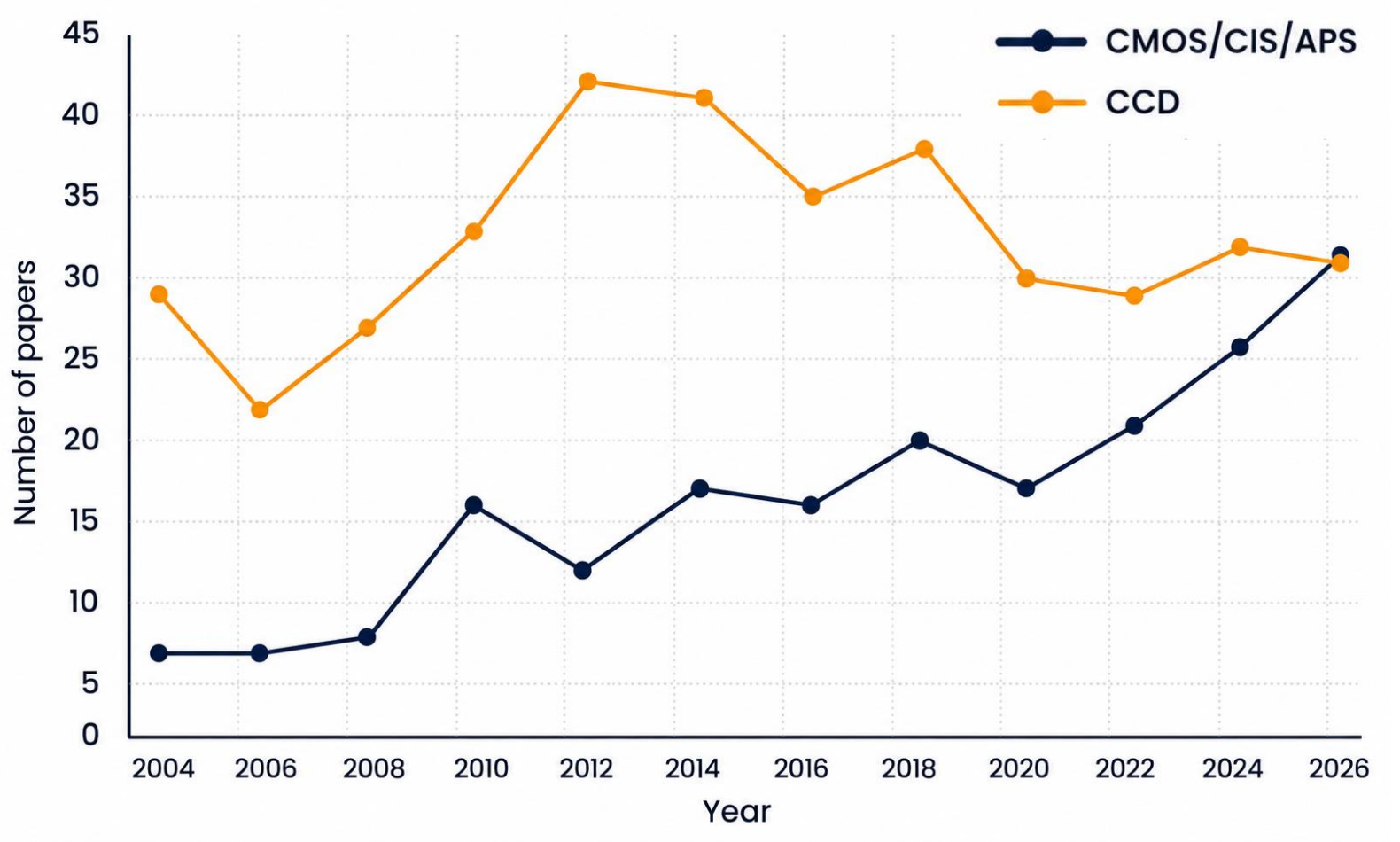
David Hall

Centre for Electronic Imaging, Open University

Wednesday 2nd September 2026

The Open University

The number of CCD and CMOS papers from the historic “X-Ray, Optical, and Infrared Detectors for Astronomy” SPIE conference series.



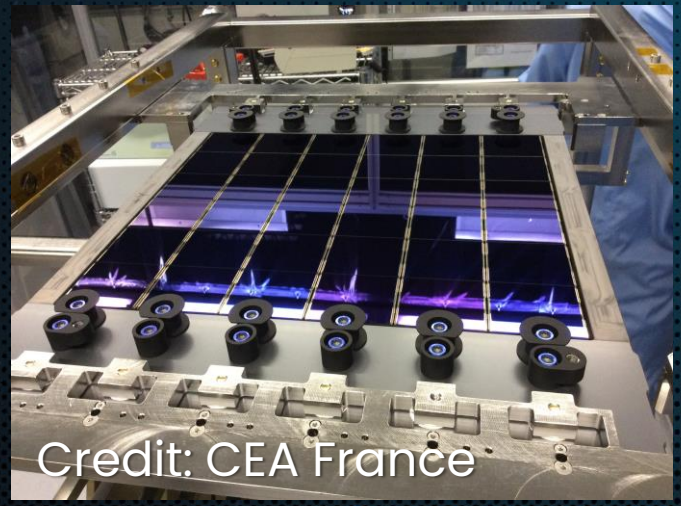
Douglas Jordan "Digital CMOS image sensors for astronomy from Teledyne: a comparison to CCDs", Proc. SPIE 14157, X-Ray, Optical, and Infrared Detectors for Astronomy XII, 1415702 (19 Aug 2026); https://doi.org/10.1117/12.3102990

How scientific requirements override market trends

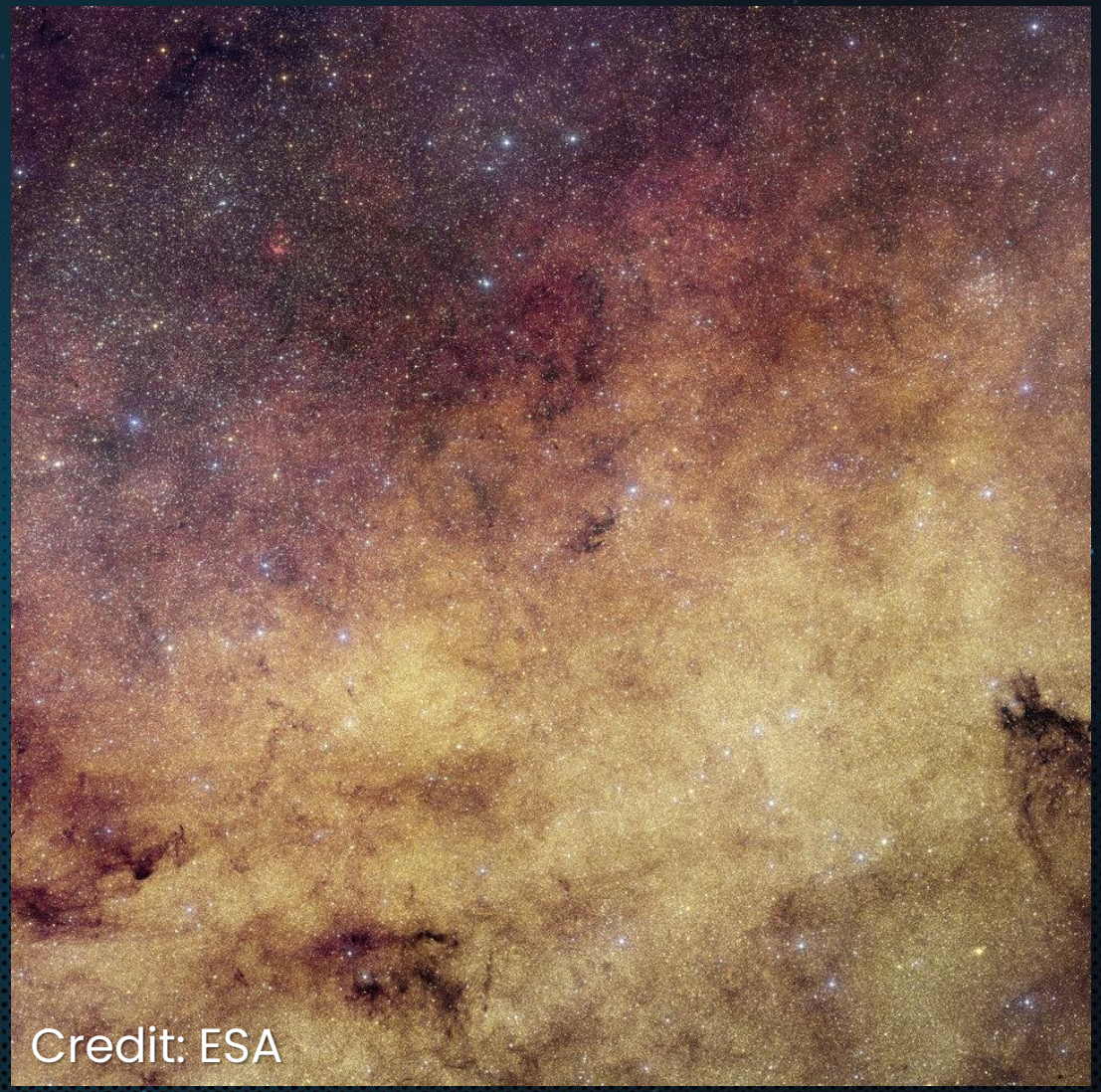
- In 1993, Eric Fossum asked "Are CCDs dinosaurs?" For decades, the answer seemed obvious: **CMOS was the future**.
- But here is the key distinction: CMOS has already won the consumer market. Smartphones, cameras, commercial imaging: CMOS dominates. However, science and space operate in a different arena.
- In 2002, James Janesick made a crucial observation: **"Both technologies will indeed coexist in the future."** Why? Because it's the requirements of particular applications (performance, integration, cost) that become the primary drivers of selection.
- For science: ultra-low noise, high reliability, radiation tolerance, and stable performance over years matter more than cost per unit or frame rates.
- But the broader lesson is that **perceived obsolescence doesn't equal actual extinction.**
- The real question isn't "who wins?" It is why do multiple technologies persist?
- The answer is that each mission has unique constraints. Detectors don't get replaced wholesale. They coexist. They find their niche.

Euclid’s VIS instrument

The largest and most detailed photo ever made of our Milky Way galaxy’s centre in visible light was revealed this summer by the European Space Agency’s Euclid mission. Packed with more than 60 million stars, this image opens the door for scientists to confirm the existence of any exoplanet found in this region and measure its mass using tiny changes in starlight over time.



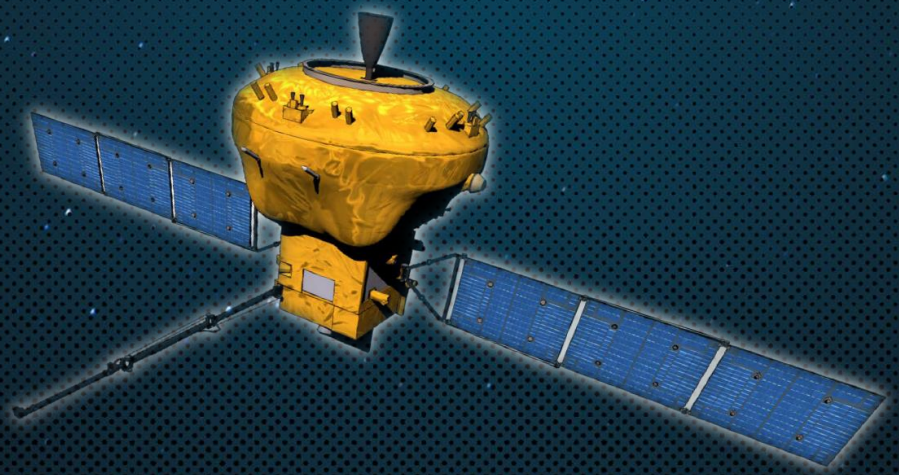
Credit: CEA France

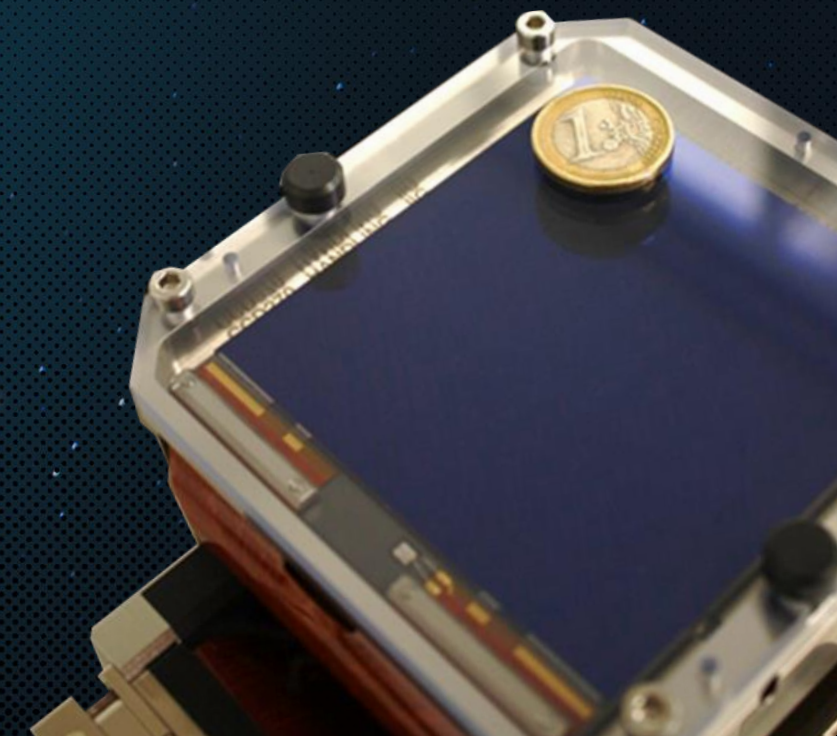


Credit: ESA

A special CCD for SMILE

- The PLATO CCD270 provides the heritage on which the SMILE CCD370 is based.
- The SMILE devices have been customised to provide enhanced performance for the smaller signals they will be detecting (200-2000 eV).
  - Narrow serial channel
  - Supplementary buried channel (SBC)
  - Higher responsivity





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Speakers

Wednesday 2 September, 10:30–12:00

1. Introduction to Detectors for Astrophysics, Space and Extreme Environments — **David Hall** (Open University)
2. Testing CMOS image sensors for future space telescope missions — **Anabel Romero Hernandez** (Open University)
3. Insights into CCD trap defects from in-orbit trap pumping on the Euclid VIS instrument — **Toby Wallage** (Open University)
4. Performance evaluation of the AstroPix v3 and v4 HV-CMOS Sensors: Results from the DESY II Testbeam — **Elizaveta Sitnikova** (Deutsches Elektronen-Synchrotron)
5. A compact Radiation Monitor for the LISA experiment — **Roberta Pillera** (Universita e INFN, Bari)

Friday 4 September, 09:00–10:00

1. Design and Beam-Test Performance of a Highly Compact Si-W Electromagnetic Calorimeter — **Veta Ghenescu** (Institute of Space Science, INFLPR)
2. On the road to extreme radiation hardness with the innovative batch of FBK nLGADs — **Robert Stephen White** (Universita e INFN Torino)
3. Systematic Study of Proton- and Neutron-Induced Radiation Damage in 4H-SiC PIN Diodes — **Sebastian Onder** (Austrian Academy of Sciences)

Posters

Posters

1. Comparative 3D TCAD Analysis of Active-Edge Planar Pixel Sensors for HL-LHC Applications — **Djemouai DJAMAI** (ISMA)
2. Early Performance Results of the CMS Phase-2 Tracker Cosmic Test Stand — **Andrew Mastronikolis** (Imperial College)
3. Study of p-type magnetic Czochralski silicon diodes with SPA- and TPA-TCT — **Nikita Kramarenko** (Helsinki Institute of Physics)
4. Fast luminosity detector based on the radiation hardness LGAD technology for SuperKEKB — **Yunyun Fan** (Chinese Academy of Sciences)
5. Solid State and Diamond Detectors for Medium to Low Energy (< 5 keV) Electrons — **Gregory Lusk** (West Virginia University)

Thank you

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