

mBryonics

ScyLight Roadmap Meeting

12th July 2017

Technology Development for End-to-End Lasercom Systems
in the 5G Era



mBryonics

- A family company based in Galway, west of Ireland
- Strong heritage in Adaptive Optics Systems for Lasercom
- Formed from the SFI Applied Optics Group at National University of Ireland

Areas of Expertise:

- Optical Design, Photonics System Design & Integration
- Adaptive Optics, Wavefront Sensing, Optical Metrology
- Atmospheric Turbulence Characterisation & Profiling,
- Imaging Systems, Image Processing, Computational Imaging
- Aerospace Systems Integration & Test

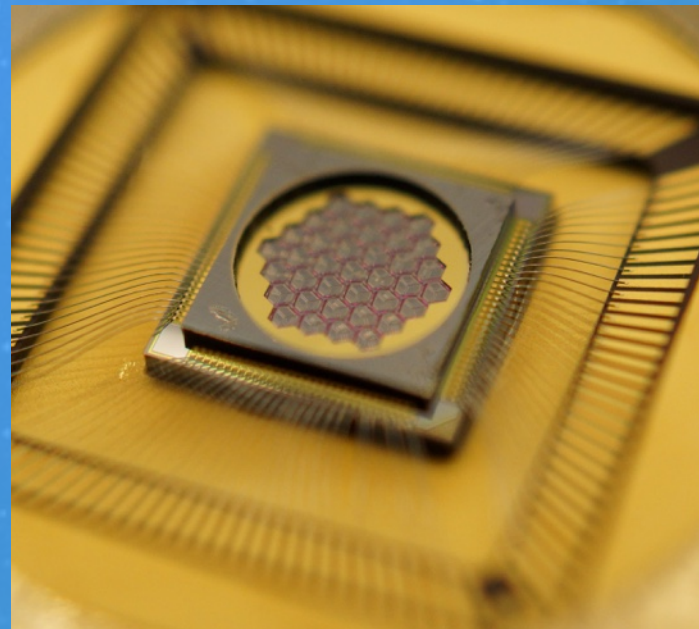


Space Photonics System

Design, Engineering, Integration, Measurement & Test

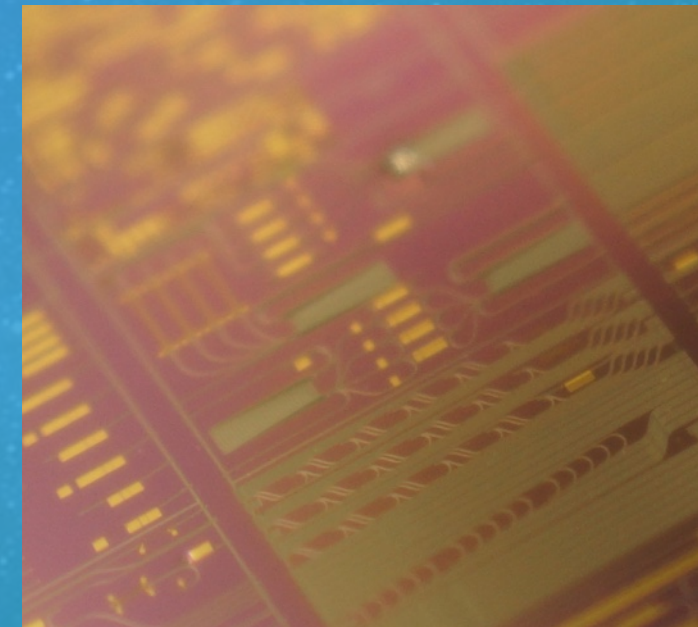
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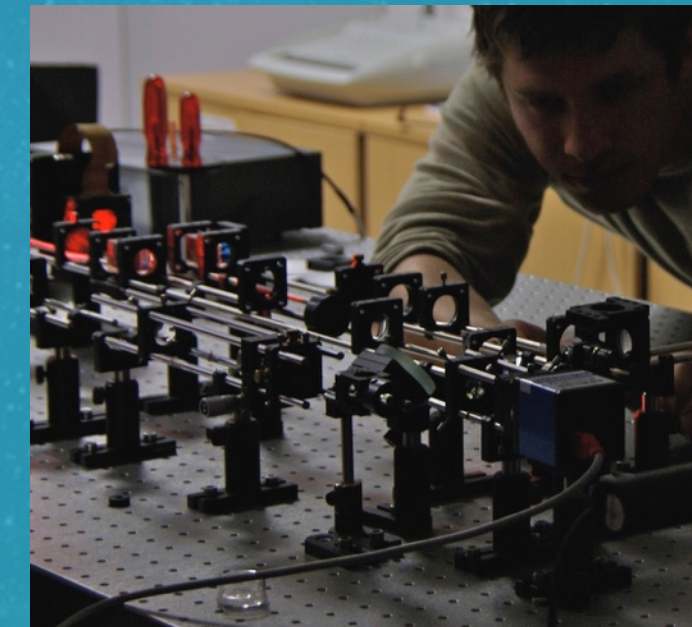
MEMS, DLP, SLM:

Specialists in optoelectronic systems & Adaptive Optics. Deformable Mirrors, Digital Light Projector, Liquid Crystal Spatial Light Modulators.



(PIC) Photonic Integrated Circuits:

PIC design and packaging for Space environment. On chip lasers and detectors for sensors & communication.



Breadboard Optical Systems:

Prototyping and development of custom metrology and test systems.



Clean Room Facility & Environmental Testing

Access:

Environmental Test Facilities in Galway & in Tyndall National Institute (ISO 17025),
Clean room ISO 5

Photonics Space Systems: Assembly, Integration & Test



NUI Galway
OÉ Gaillimh



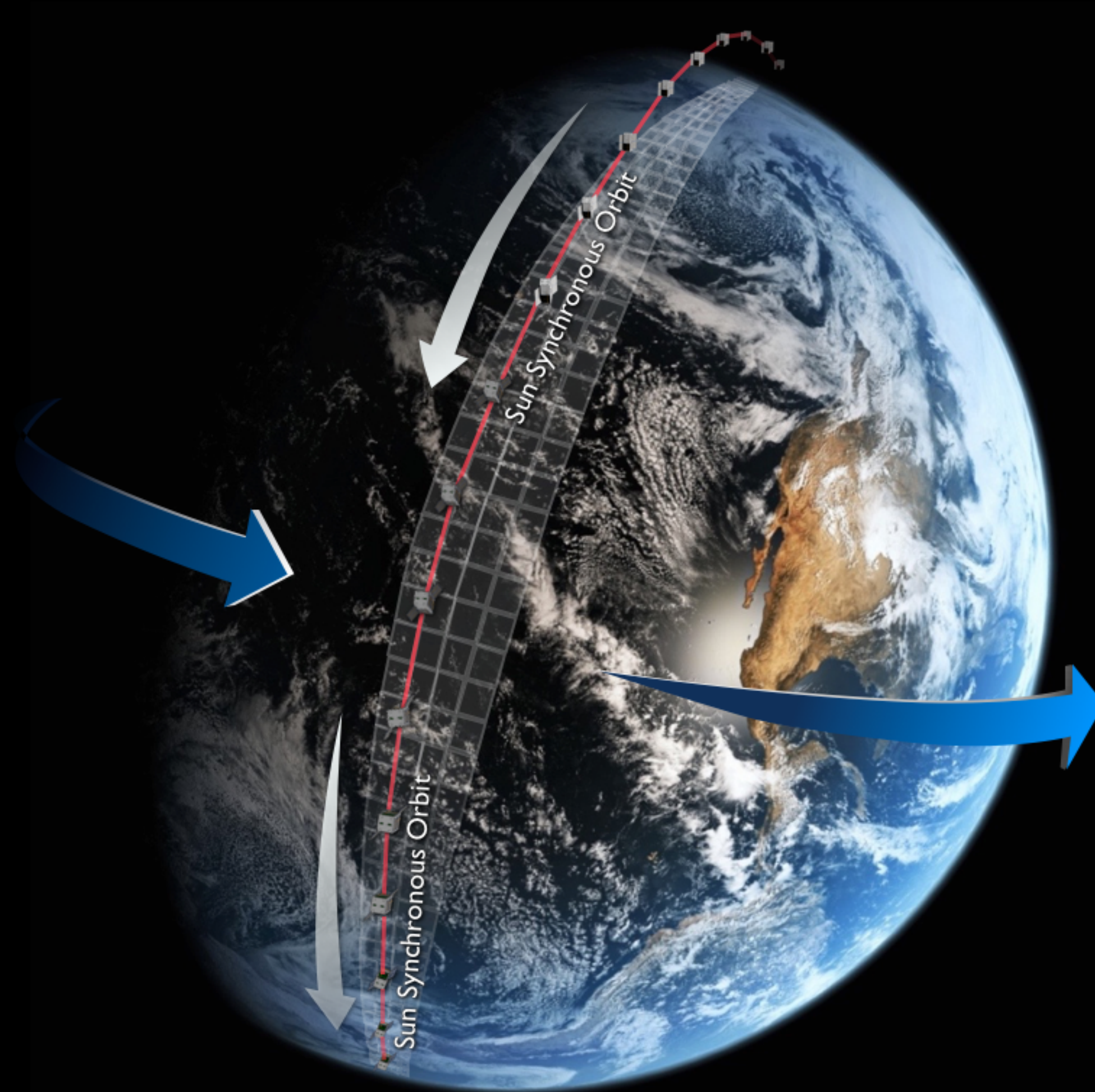
- Custom PIC design and packaging solutions
- Hermetically sealed for harsh space environment
- Applications: Sensors, optical switches, modems
- Working in partnership with Tyndall Packaging, NUI Galway & Foundries in Europe
- Opening new HQ in the heart of Galway City with all packaging operations under one roof



“Open for Business Today!”

Real Time Access to Virtual Earth Observation Network

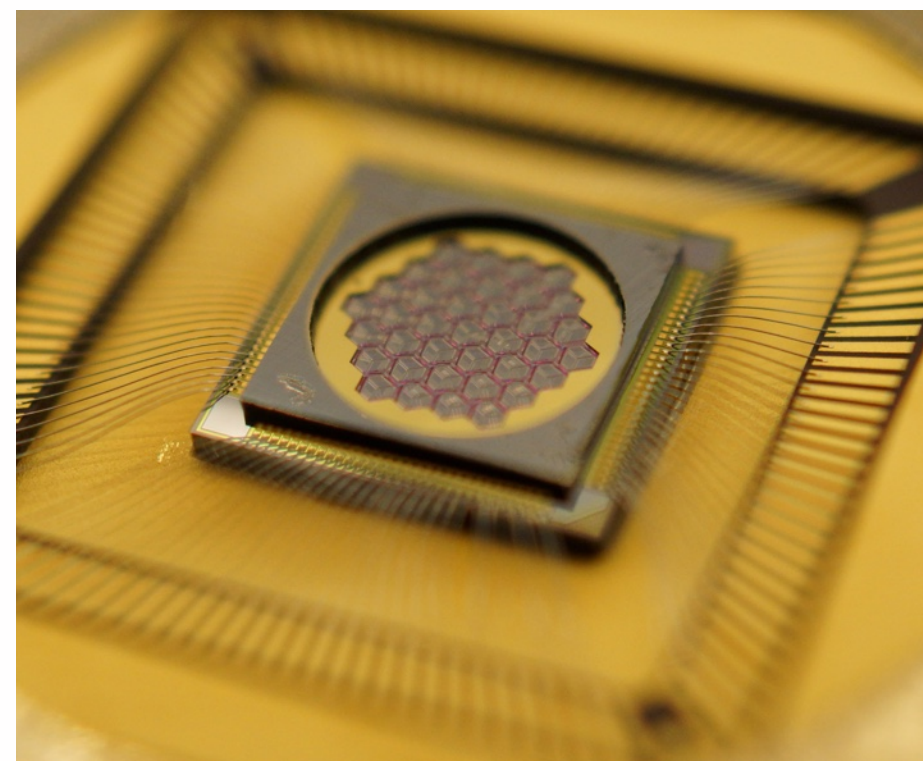
- Software Defined Network
- Small & Nano Satellites in LEO
- UAVs, HAPs, ships, aircraft
- Lasercom Space Links (LEO-LEO & LEO-GEO) and Feeder Links
- Distributed Ground Station Network
- Distributed Data Centres
- Combination of Edge Processing & Cloud Integration



Technology Focus Areas

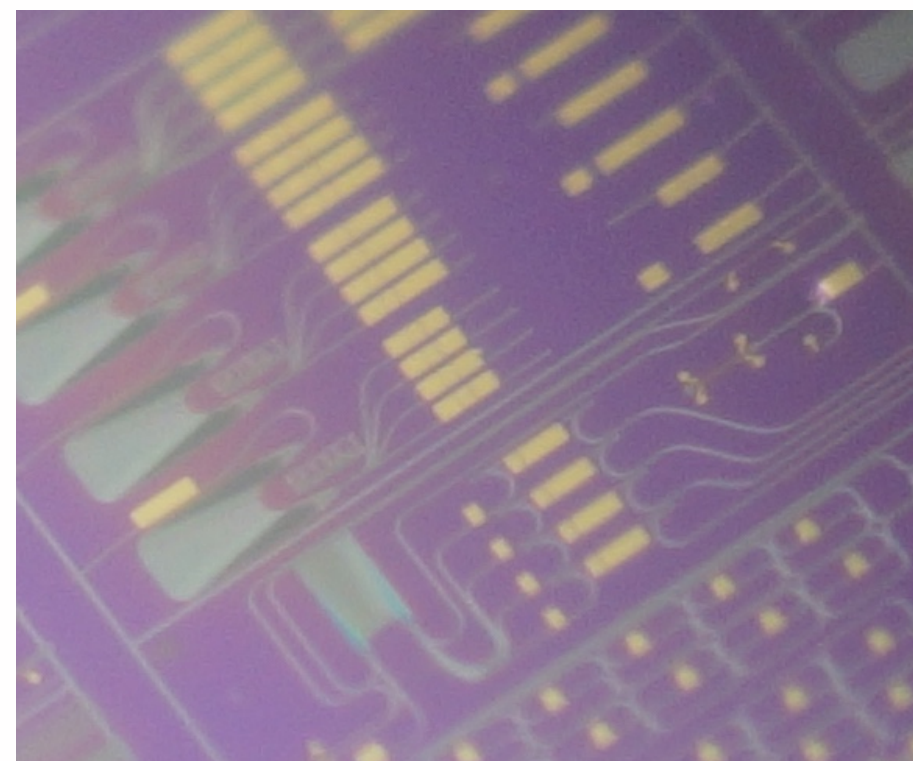
Adaptive Optics

- Deformable Mirror & WFS systems
- Optical Phased Arrays
- Low price point
- Easy to install & use
- Robust in scintillation - Low satellite elevations



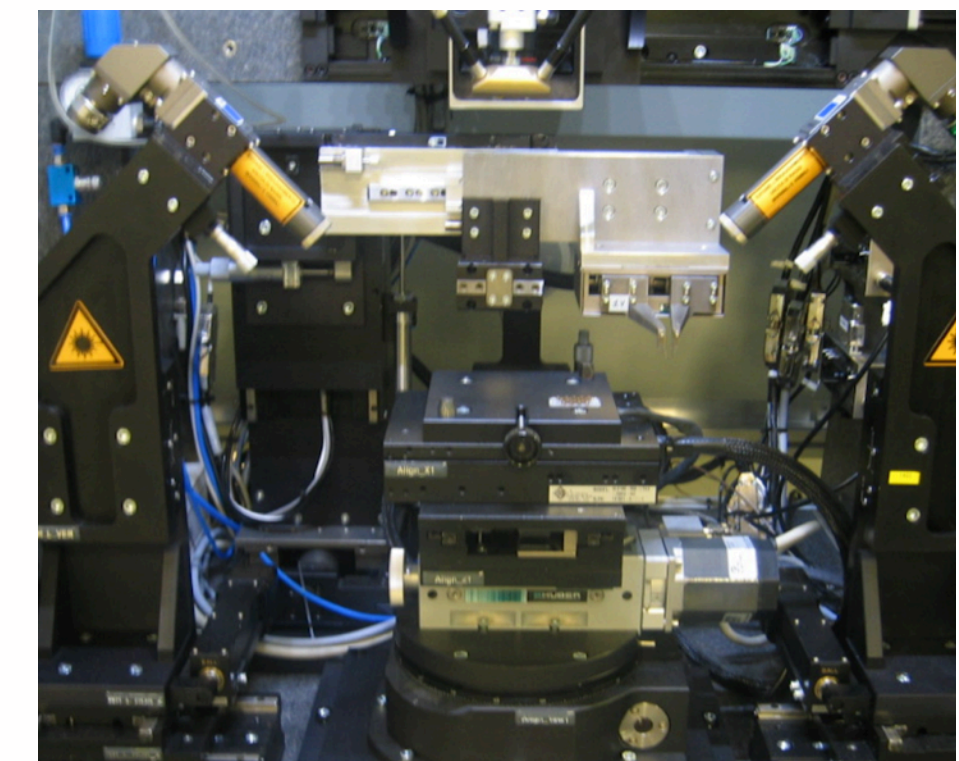
Photonic Integrated Circuits (PIC)

- 10Gb/s Optical Modem
- Coherent Transceiver & IM/DD,
- Optical Switching
- Low power, systems on chip, designed for mass production



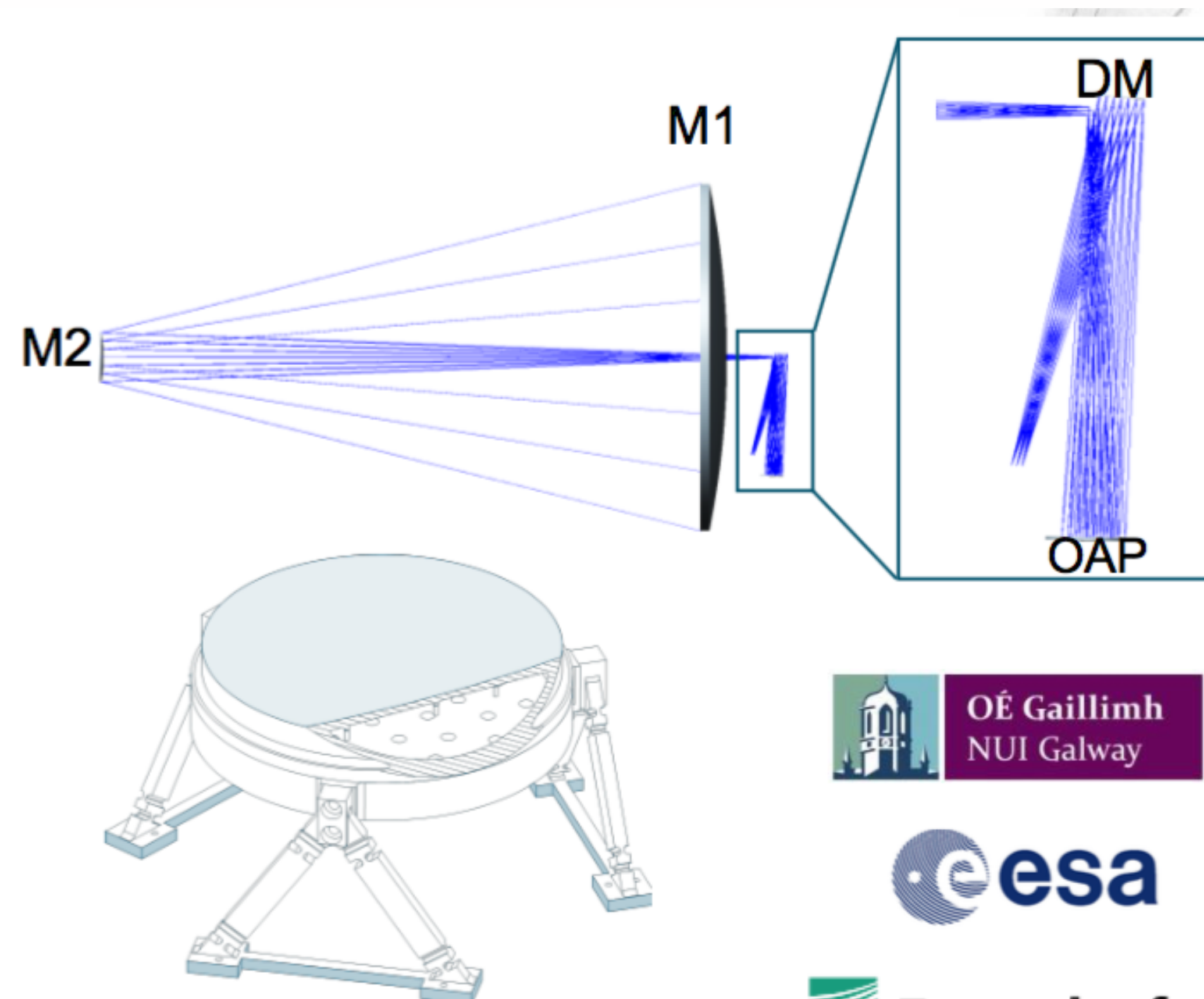
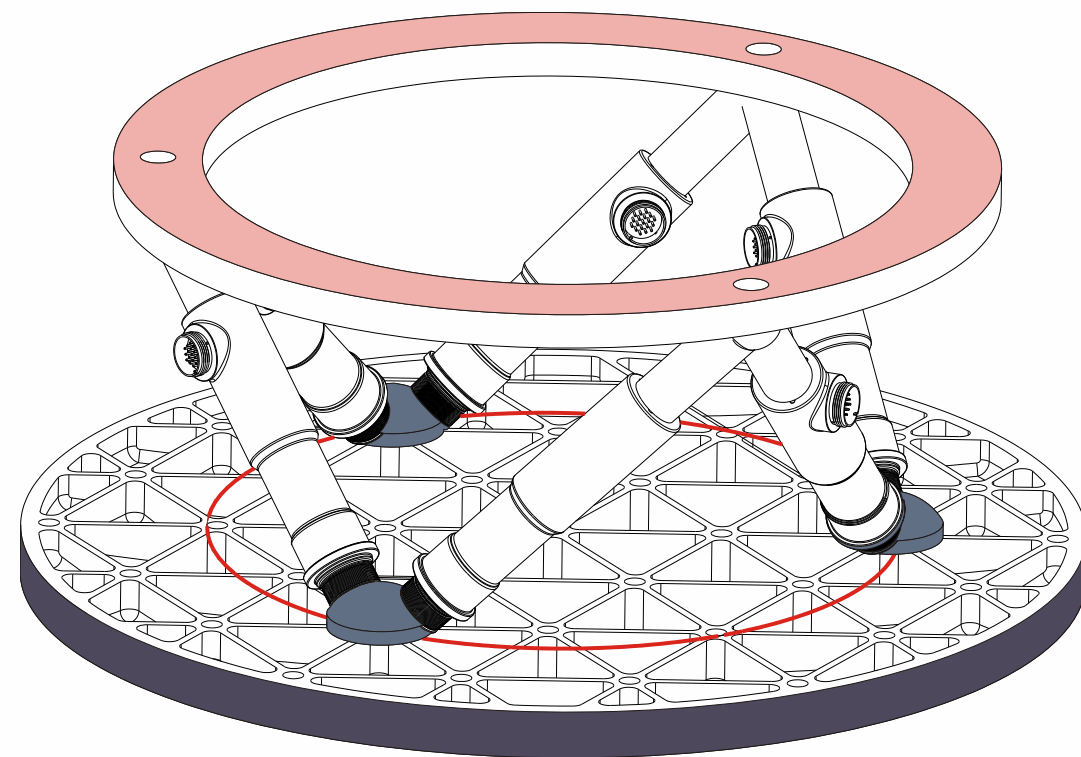
Space Packaging for PICs

- Multiple I/O Single Mode Fibre
- Space Hardened Connectors
- Thermal Design
- RF Design



Deep Space Laser Communication Telescope

- Simple design to maximise throughput & minimise cost
- 4m class telescope to fit inside Ariane 5 fairing
- Ultra-stable active wavefront control



Contact: **Nicholas Devaney**, National University of Ireland Galway
email: nicholas.devaney@nuigalway.ie

Devaney et al. ICSO 2016, Hypatia – a 4m active space telescope; concept and capabilities



ESA Roadmap

- End-to-End systems
- Ground station roll-out
- Virtualised Networks & Software Defined Networks
- Coordinate efforts with mm wave for 5G era rollout
- ‘Satcom for 5G’ - ScyLight integration
- Engage the community in the standards - CCSDS, 3GPP, 5GPPP, IEEE, ETSI
- New hardware development - flight heritage opportunities
- Leverage existing expertise in Europe & H2020

IOT & 5G Network Testing in Ireland

- Nationwide testbeds for IOT in place
- Part of LoRa Alliance
- Supported by Science Foundation Ireland, Research Institutes, Centres of Excellence & ComReg
- SmartBay marine network
- 100GHz testbed underway
- Significant R&D hub for network operators and stakeholders





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