

NXTGEN hightech

Chips, satellites and tomatoes Break-out A4



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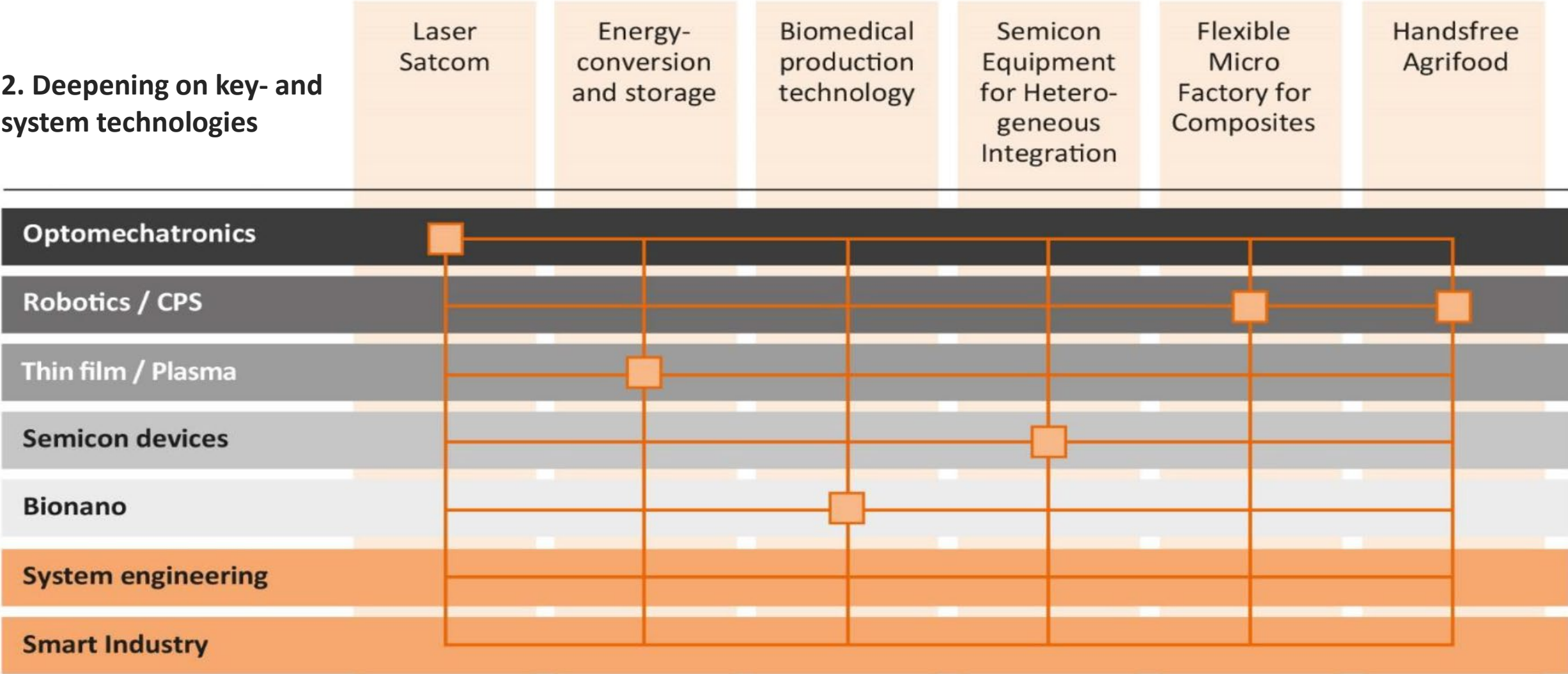
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Program Manager
Semicon

1. Applications in new value chains

 Leading application domain

2. Deepening on key- and system technologies



3. Strengthening of the ecosystem

Vision & roadmaps • Facilities • Connections • Capital • Skills • Internationalization

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Niek Doelman

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Principal scientist at TNO
and professor at Eindhoven University of Technology, Control of optical waves



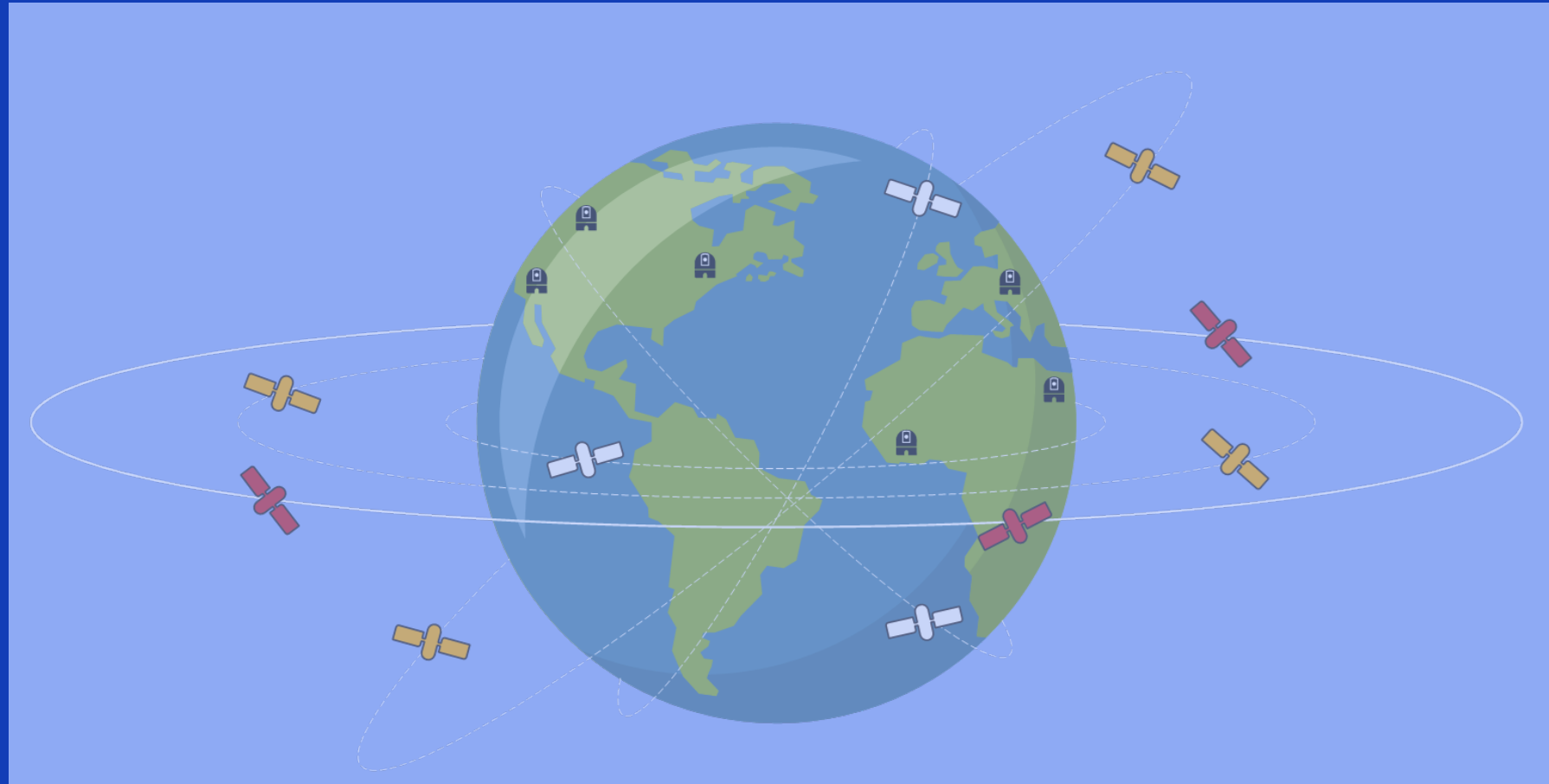
Laser Satellite Communication

Opto-Mechatronics technology

Niek Doelman

TNO innovation
for life

TU/e EINDHOVEN
UNIVERSITY OF
TECHNOLOGY



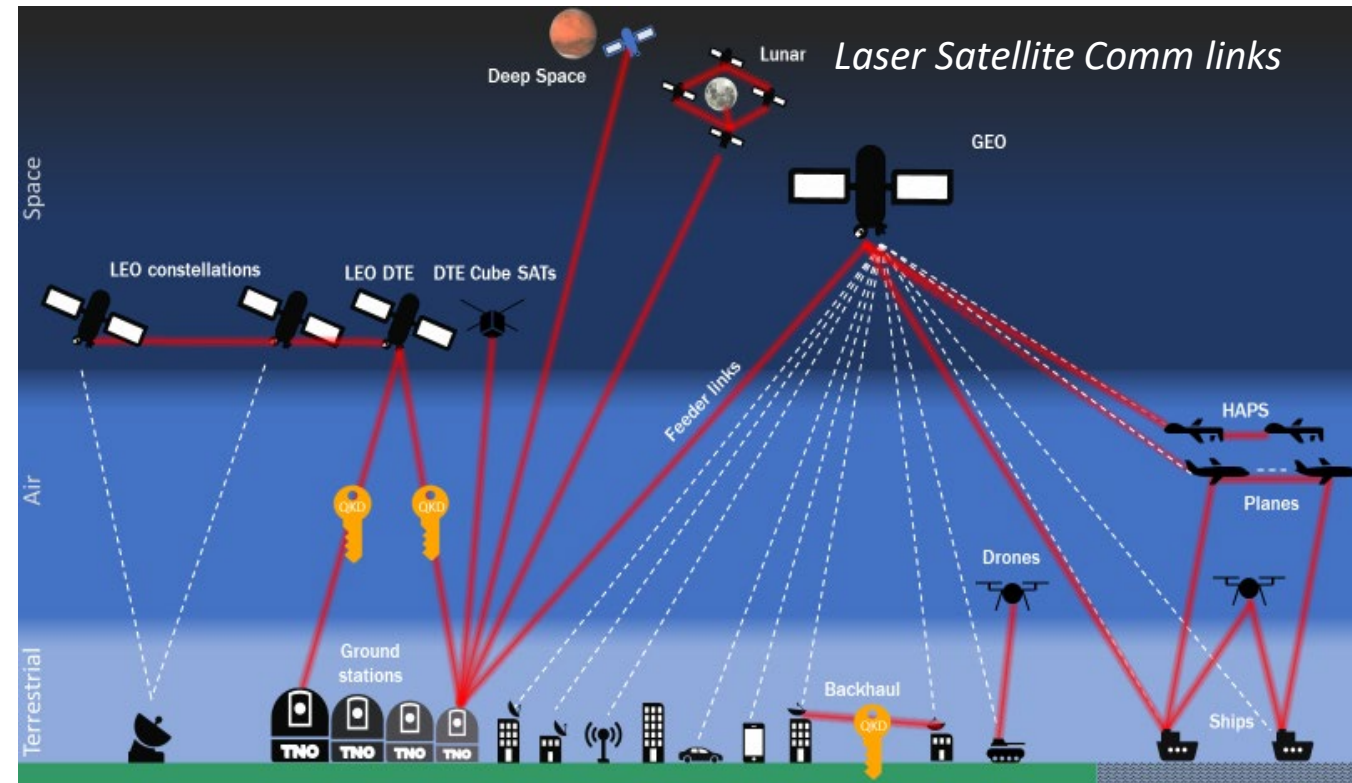
Laser Satellite Communication

Impact

- Secure, high data-rate communication links
- Digital connectivity – everytime, everywhere, everyone

1st generation

- Successful developments of links and terminals
- Proof of performance
- In-orbit demonstrations
- Non-Terrestrial Network



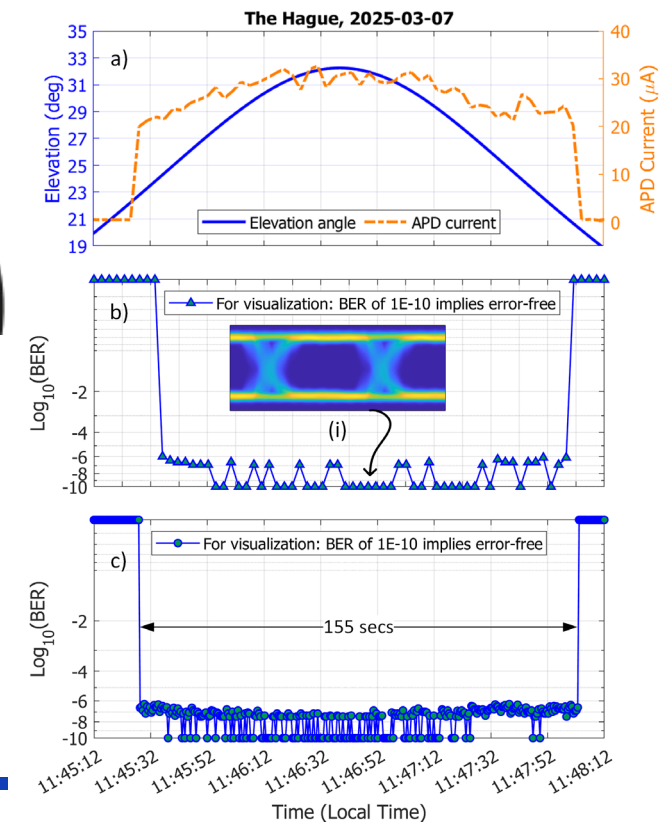
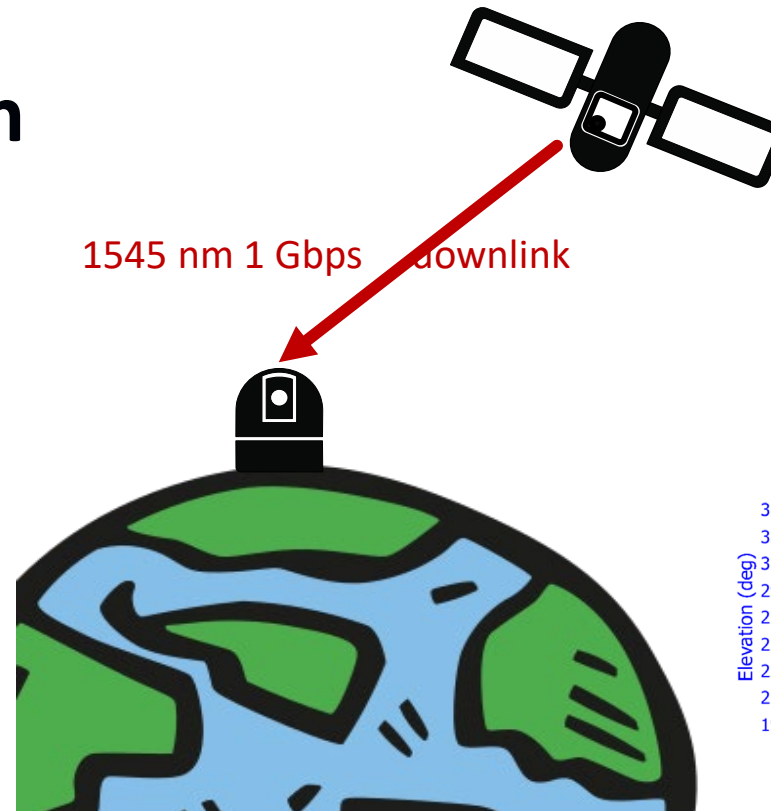
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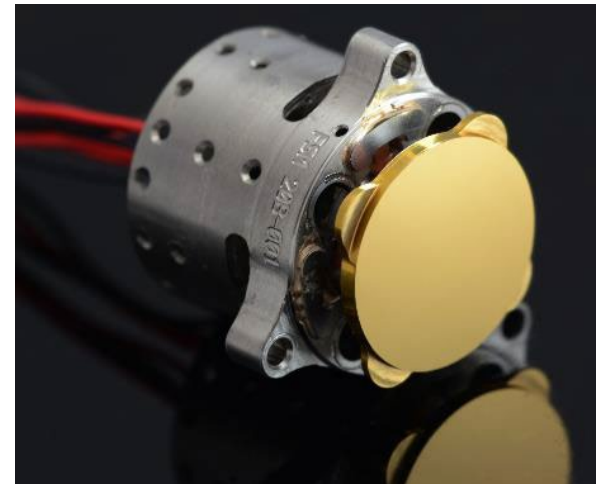
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Laser Satellite Communication

Challenges – specific LSC

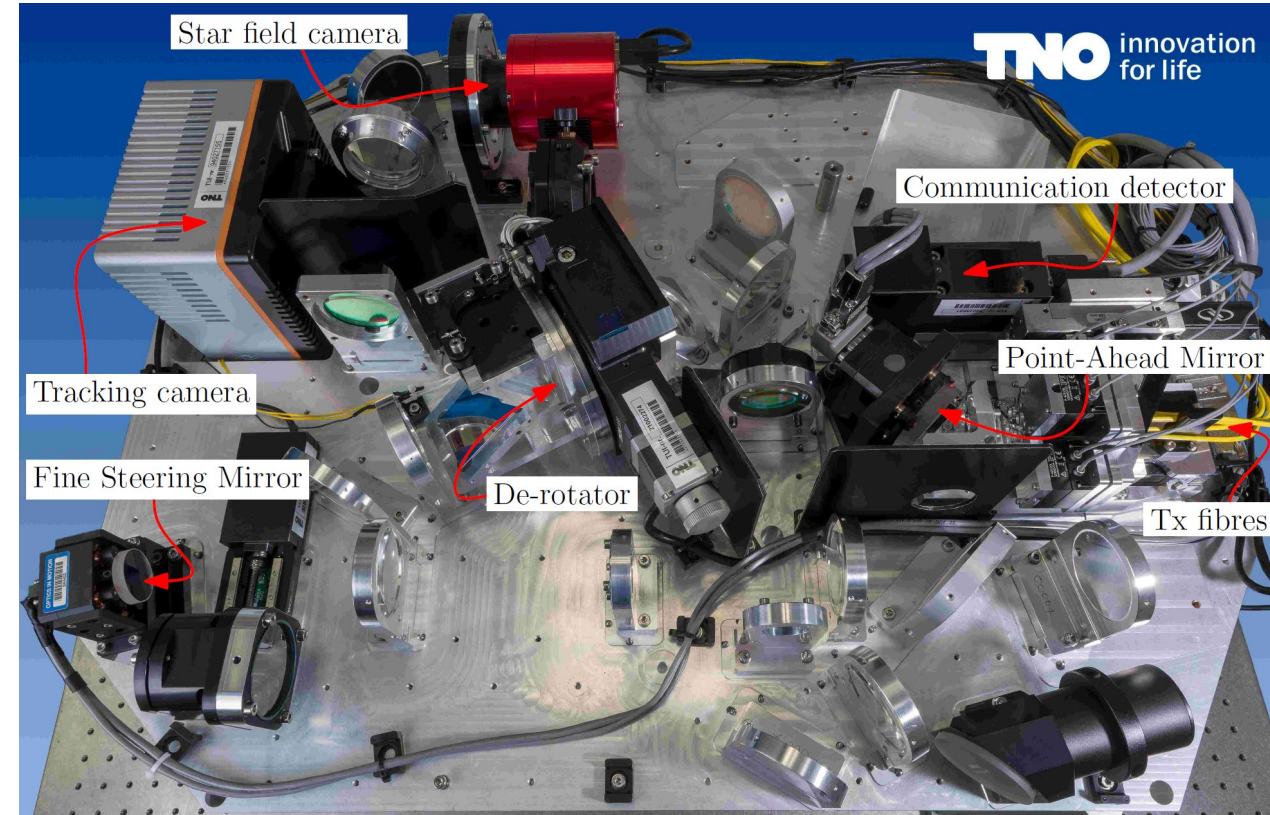
- **Low** Size Weight and Power (SWaP)
- **Low** Cost
- **Pointing Acquisition and Tracking**
 - High angular range, high resolution
 - High control bandwidth
 - Vibration isolation
- **High photon efficiency**
 - Link budget margins
- **Atmospheric conditions**
 - High reliability
- **Multi-beam solutions**
- **High laser power**



Laser Satellite Communication

Challenges – system level

- **Low Size Weight and Power (SWaP)**
- **Low Cost**
- **Integrated Photonics**
 - Bigger role in low SWaP
- **OM Design Process**
 - Optics – mechanics – control - electronics
 - Accelerated, more automated
- **Emerging Technologies** – AI, Add. Manuf., Quantum
 - Optimal use and integration
- **Adjustable/ adaptive OM properties**
 - Control and decision strategies
 - Mechanisms



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