

### MERMIG aim

Space system vendors seek for solutions to deliver small size and cost-effective sensor systems to “de-congest” satellite payloads, drastically reduce the equipment cost and open the possibility for new generation of micro-payload systems.

MERMIG invests in the right mix of silicon photonic CMOS-compatible component fabrication and nano-imprint lithography laser fabrication for developing low-cost, compact, and power-efficient gyroscopes responding to the need for robust IMUs. Both technologies are being adopted by the terrestrial telecom market and MERMIG will develop them for bringing their unique advantages into space sensor systems.

MERMIG will squeeze the gyroscope functionality into a few cm<sup>2</sup>, integrating a racetrack cavity, PIN junctions and a phase decoder into compact sub-micron waveguides. The MERMIG “smart” packaging technique will allow power-efficient optical pumping and hermetic packaging of the gyro-photonic chip. MERMIG will develop the first 1550nm high-power laser with a fiber-coupled power of 150mW using an integrated laser MOPA, fabricated with advanced nano-imprint lithography (NIL). The 150mW delivered will enable a modular architecture, with pump sharing among 3 integrated silicon lasing cavities, for 3-axis sensing. The single-step NIL process enables fast wafer scale patterning and ensures low-cost and high-volume laser production.

Finally, MERMIG will bring together photonics and electronics on a fully-functional opto-electronic gyroscope system prototype characterized according to ASTRIUM testplan procedures. MERMIG will deliver to ASTRIUM a new generation gyroscope that will weigh <1kg, consume <5W electrical power in a few cm<sup>3</sup> footprint. The angle random walk range that will be feasible within MERMIG is 0.1 – 0.01 deg/sqrt(hr) suitable for telecommunications and scientific satellites. The technology full potential can allow for future opto-electronic integration of photonic “gyroscopes-on-a-chip”.

**Fiber Optic Gyroscope**



**CMOS photonics  
&  
nano-imprint  
lithography**



**MERMIG gyro-board**

