MERMIG will design and develop the first modular photonic integrated gyroscope exploiting Raman lasing in silicon-on-insulator (SOI) nanowaveguides. To address the key challenges of small size, power consumption and low-cost, MERMIG invests in CMOS-compatible fabrication of silicon photonic circuits and nano-imprint lithography fabrication of high-performance lasers. Both technologies are being successfully adopted by the terrestrial telecom market and MERMIG will develop and apply them to bring competitive advantages for the development of new generation gyroscope sensors in aerospace.

The inherent advantages of both technologies that will play a key role in MERMIG development are:

- **Cost-effective silicon gyroscope photonic integrated circuit fabrication** relying on high yield and CMOS compatible fabrication processes. MERMIG will use the silicon material for the development of the SGPIC circuit. This is a high yield fabrication processes relying on low-cost, 6-inch wafers that can be processed in silicon foundries with CMOS compatible techniques, i.e. with a standard toolset used for micro-electronics. As such, SGPIC circuit sensors can be fabricated in high volumes and at a very low cost with the strong potential of electronics optics co-integration on CMOS that will bring about even smaller and more functional sensor chipsets.

- **Cost-effective nano-imprint lithography** for fabrication of high performance gyroscope laser module (GLM). MERMIG will use nano-imprint lithography for the development of a highperformance yet cost-effective gyroscope optical pump source. Nano-imprint lithography can be used to fabricate any type of nano-photonic surface relief and is suitable for cost-effective mass-production due to the fast wafer scale patterning. As such, it is technically possible to fabricate GLM modules in high volumes and at low-cost with the ability to couple >100 mW into a fibre with a MOPA structure.