

# 16<sup>th</sup> ESA Workshop on Avionics, Data, Control and Software Systems

## Companies Flash Presentations



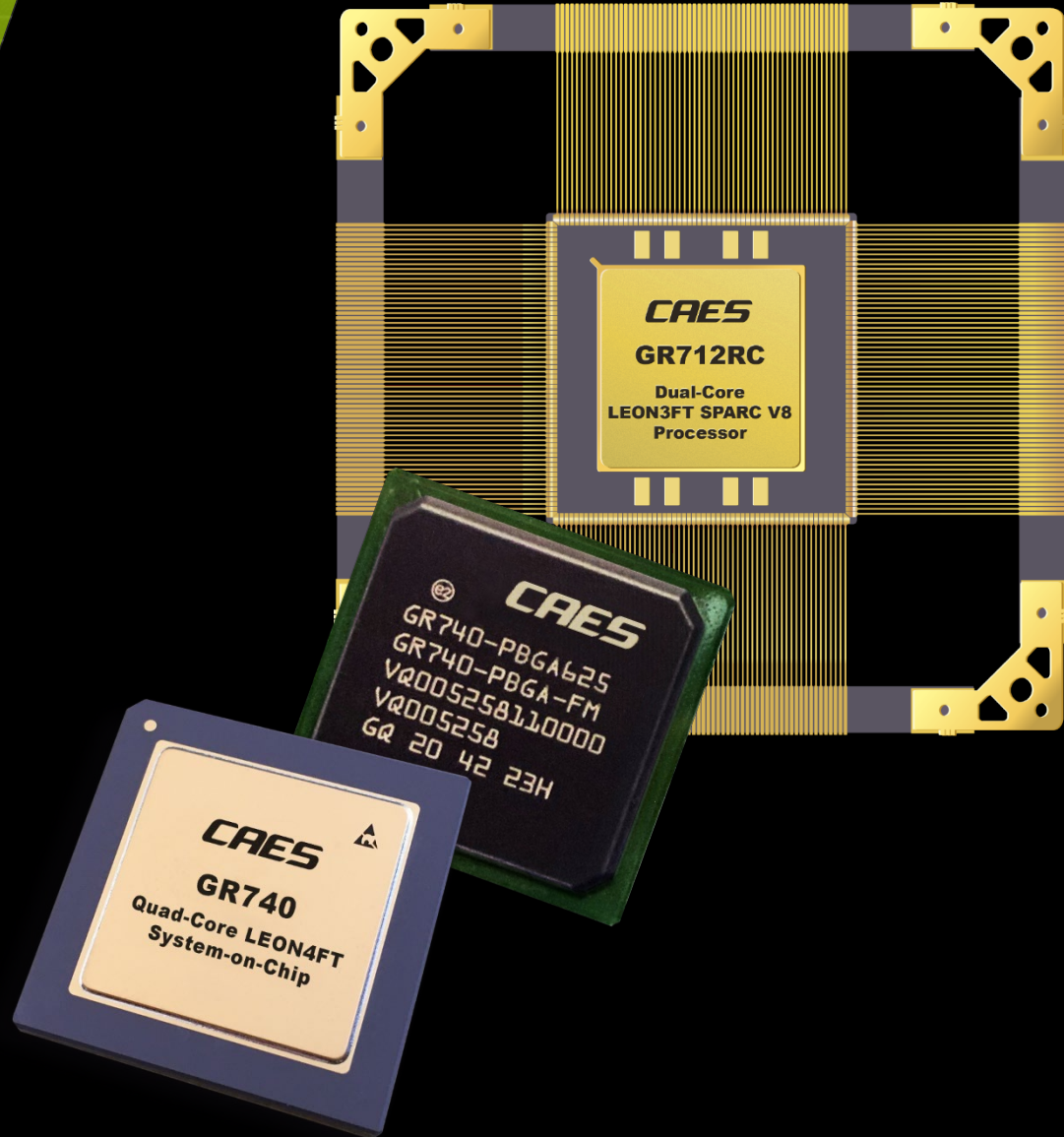
ESA ESTEC – 25 October 2022  
Ref: ESA-TECED-HO-2022-003293

ESA UNCLASSIFIED – For ESA Official Use Only

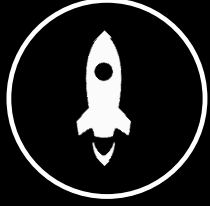


→ THE EUROPEAN SPACE AGENCY

**CAES**



**Gaisler Products**  
**Gothenburg, Sweden**



A world leader in embedded computer systems for harsh environments



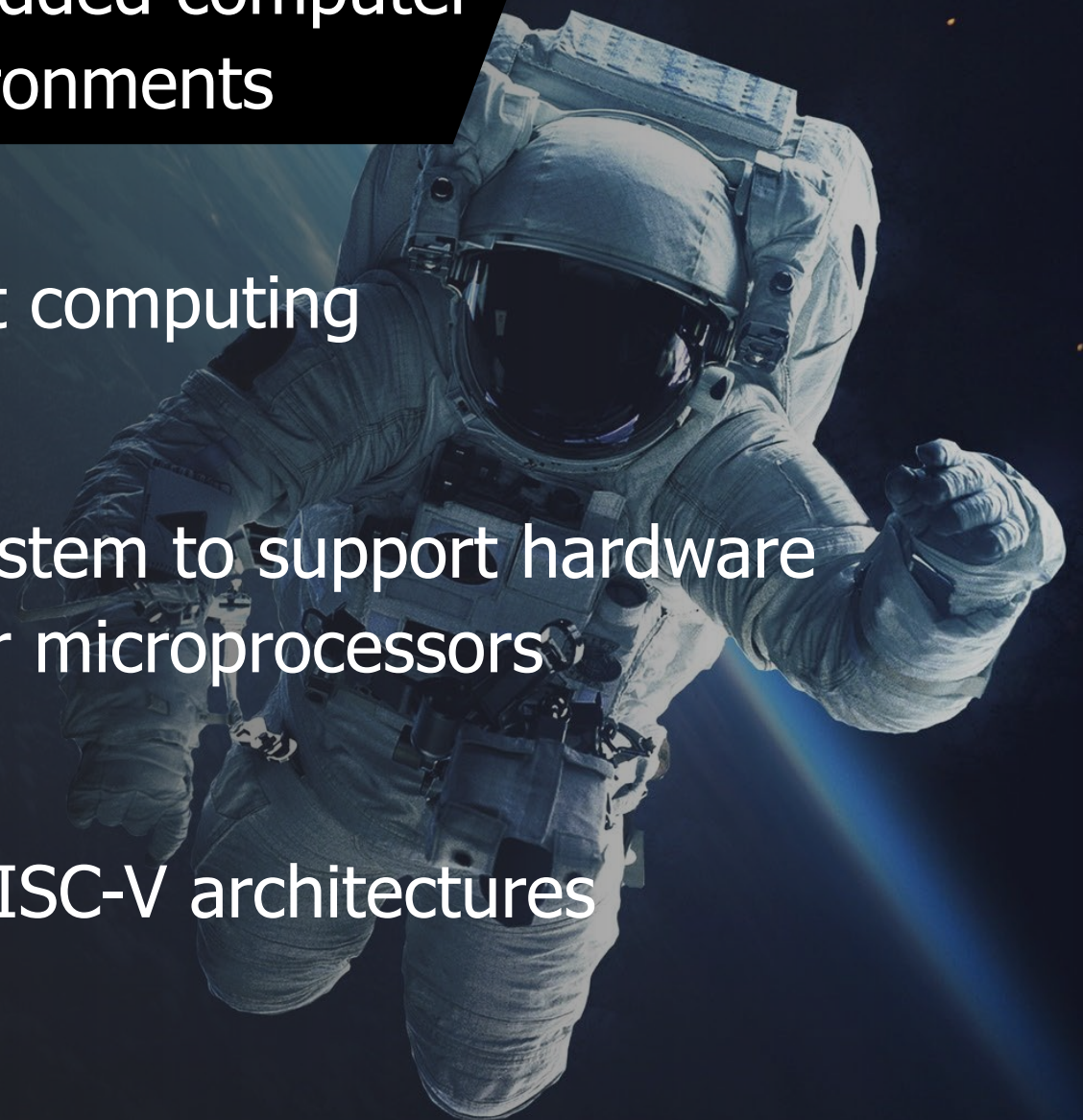
Experts in fault-tolerant computing



We provide a full ecosystem to support hardware and software design for microprocessors



Based on SPARC and RISC-V architectures





Established in 2001 as a spin-off from the European Space Agency



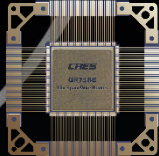
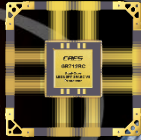
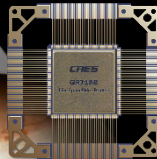
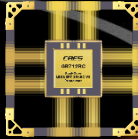
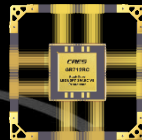
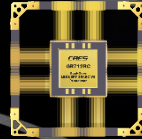
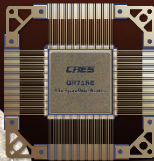
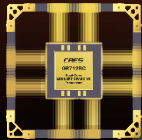
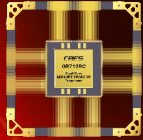
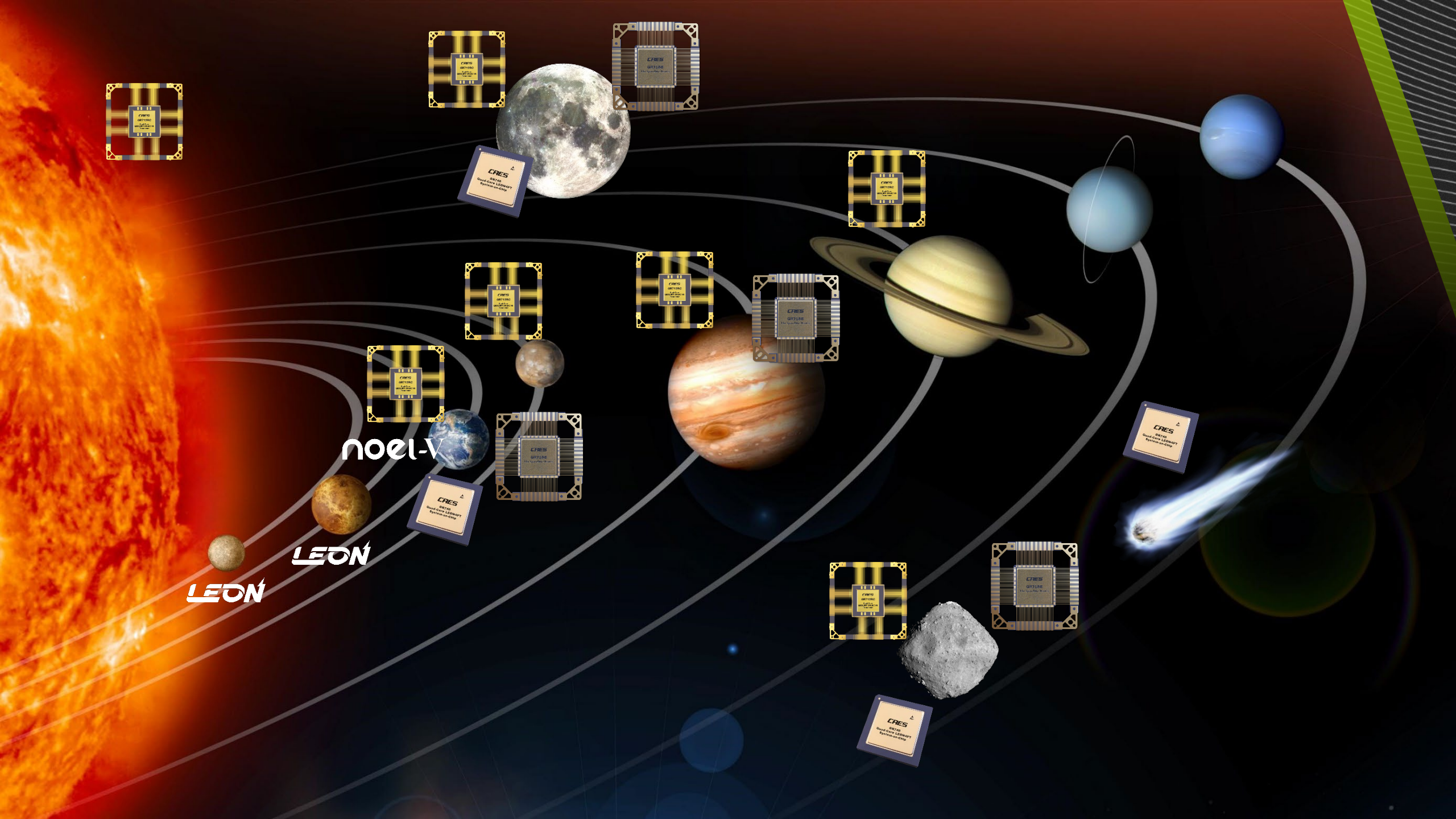
Located in Gothenburg, Sweden



55+ employees in Sweden



Capabilities: software and ASIC/FPGA design  
Facilities: component lab

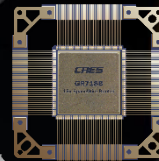
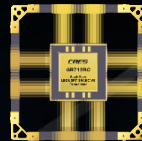


noel-v



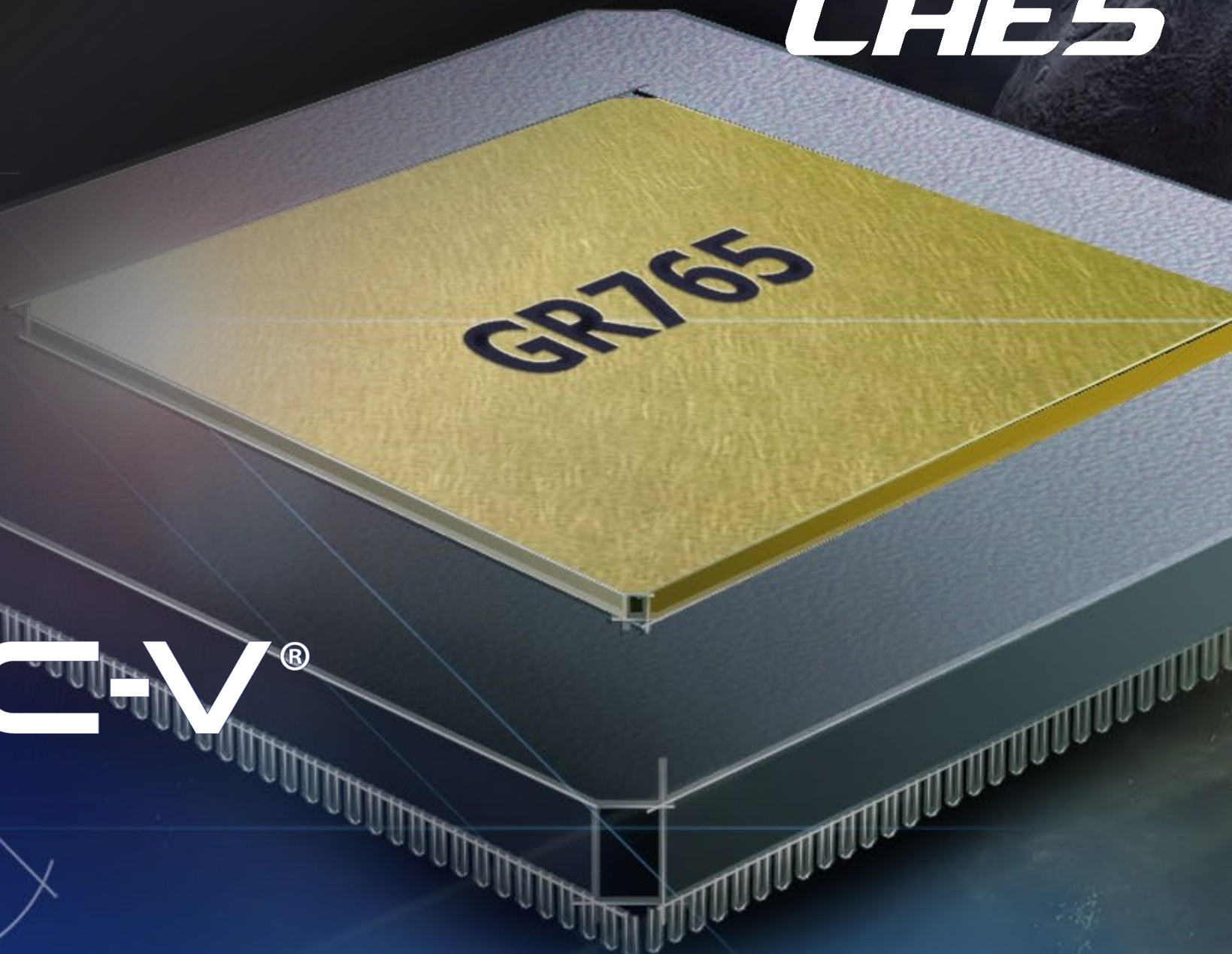
LEON

LEON





*CAES*



SPARC

RISCV<sup>®</sup>



esa | *CAES*

# GR740 USER DAY | 2022

13<sup>th</sup> of December 2022

ERASMUS Auditorium, ESTEC

[www.gr740.space](http://www.gr740.space)

***CAES***

**[www.caes.com/Gaisler](http://www.caes.com/Gaisler)**

**Gaisler Products  
Gothenburg, Sweden**

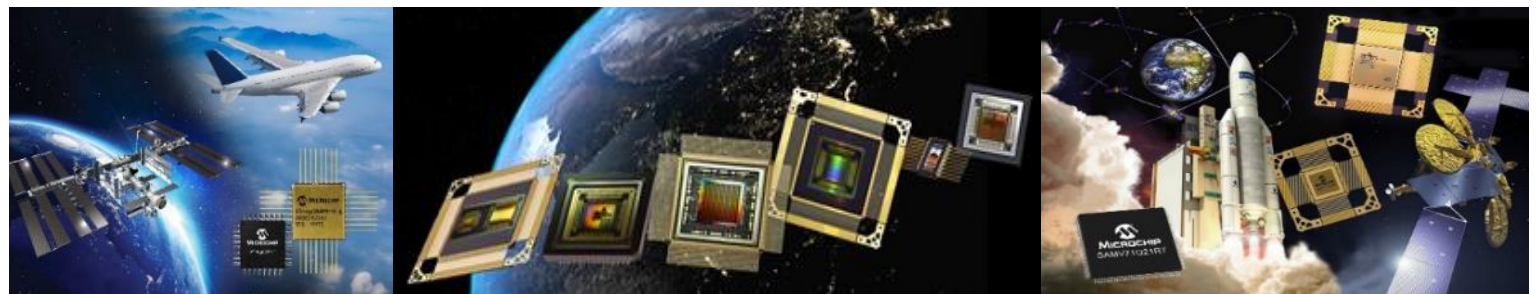




# Microchip @ADCSS 2022



A Leading Provider of Smart, Connected and Secure Embedded Control Solutions



SMART | CONNECTED | SECURE

Nicolas GANRY

Oct 2022

# Microchip's Broad Portfolio & Market Coverage



**# 1 Semiconductor Supplier in Aerospace and Defense**

# A&D Product Lines in Europe



Nantes, France



Rousset, France



- **Advanced Packaging UK**
  - ✓ Expertise in miniaturisation vs. size, power and reliability

- **ADG France**
  - ✓ Mixed Signal ASIC
  - ✓ Processors and Microcontrollers
  - ✓ Com interfaces and Memories



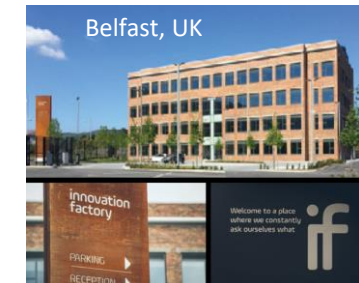
Bordeaux, France

- **DPM France**
  - ✓ Power Modules



Ennis, Ireland

- **DPM Ireland**
  - ✓ Hi-Reliability Discrete
  - ✓ Power Modules



Belfast, UK

- **Vectron Germany**
  - ✓ Oscillators
  - ✓ RF SAW Filters



- **RF Microwave UK**
  - ✓ Amplifiers

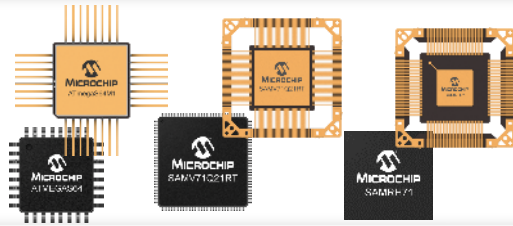


Teltow & Neckarbischofsheim, Germany

# Largest Space Semiconductors Portfolio

## MPUs and MCUs

8-bit AVR®  
32-bit SPARC V8 and arm M3 & M7  
GNSS SoC



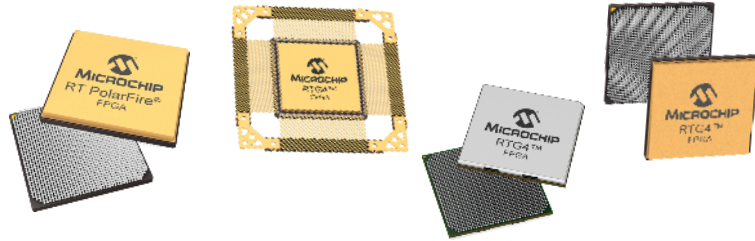
## Communication Interface and memories

SpaceWire, Ethernet, CAN  
SRAM  
NVM memories



## FPGAs

RT PolarFire®  
RTG4™  
RT ProASIC3®  
RTAX™, RTSX-SU



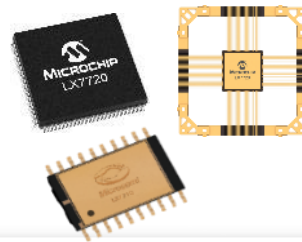
## Power Solutions

Rad-hard JANS Diodes, Bi-Polar Small Signal Transistors  
Rad-hard Isolated DC-DC Converter Modules  
Custom Power Supplies 2 W to > 5 KW  
Point of Load Hybrid Solutions  
Electromechanical Relays



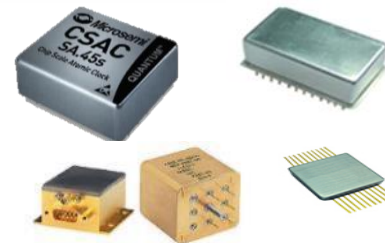
## Mixed Signal Integrated Circuits

Telemetry and Motor Control Space System Managers  
Power Supply protection



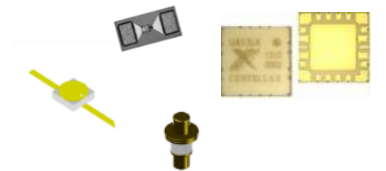
## Timing solutions and Oscillators

Ovenized Quartz Oscillators  
Hybrid Voltage Controlled and  
Temperature Compensated Crystal Oscillators  
Cesium Clocks  
Chip Scale Atomic Clock (CSAC)

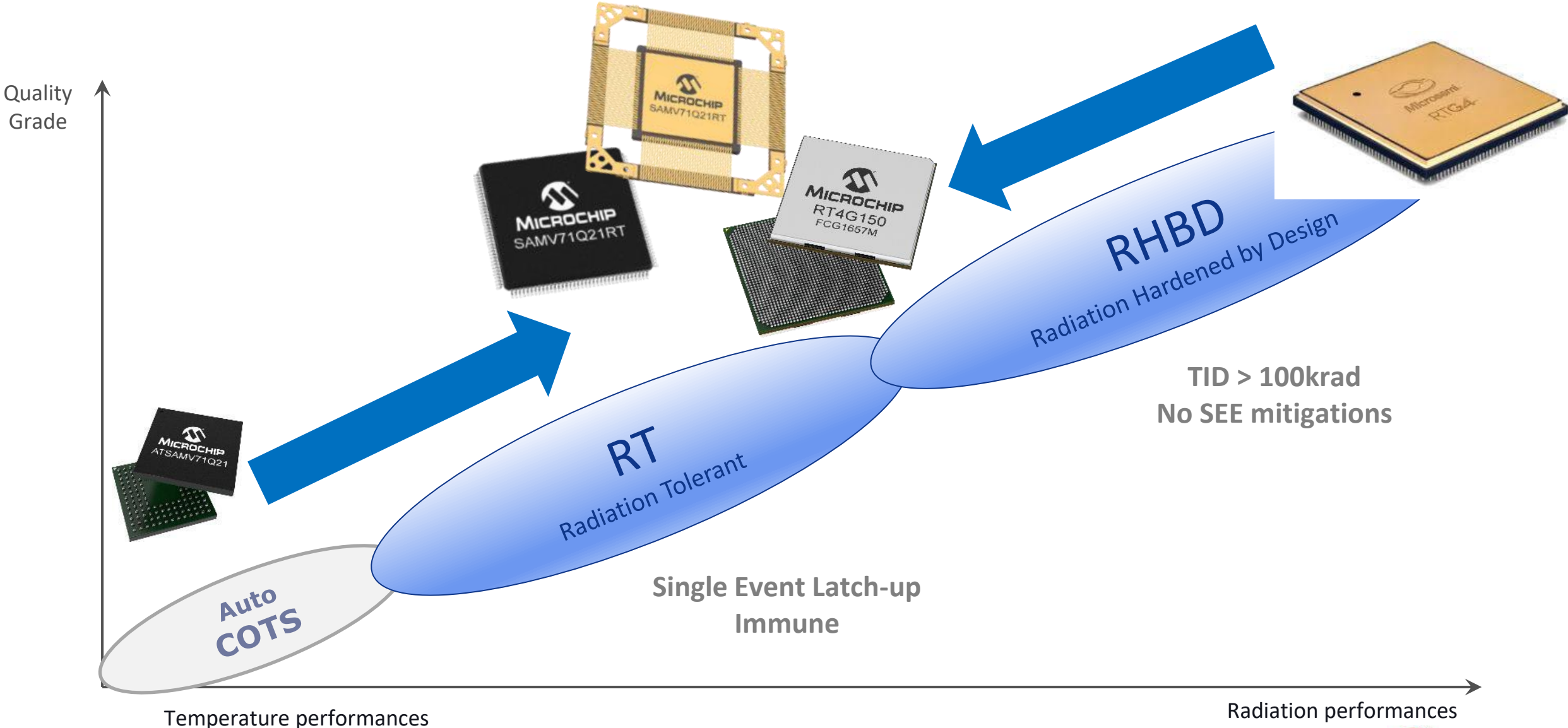


## RF Products

Packaged and Chip Si and GaAs RF Diodes,  
SAW filters,  
Packaged and bare die GaN and GaAs MMICs  
GaN on SiC HEMT transistors



# Scalable Solutions to face New Space challenges

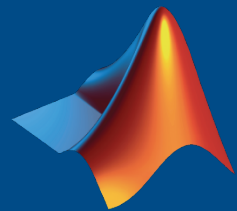


# Explore Microchip Unique Scalable Solutions for New Space



## Thank You

[New Space Web](#)



# MathWorks®

*Accelerating the pace of engineering and science*

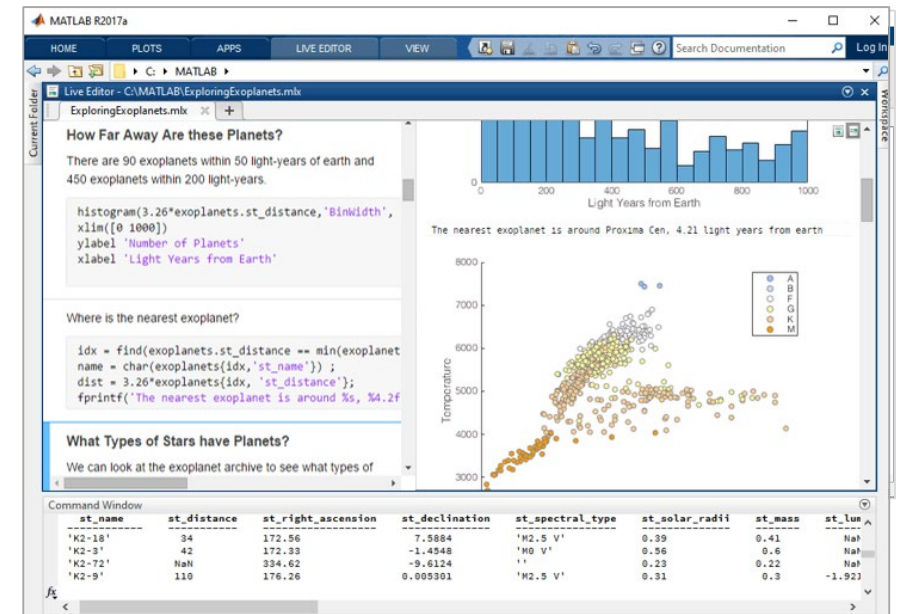
The leading developer of mathematical computing software  
for engineers and scientists.

# MATLAB® & SIMULINK®



- MATLAB is a programming environment for algorithm development, data analysis, visualization, and numeric computation.
- Simulink is a graphical environment for designing, simulating, and testing systems.
- More than 120 add-on products for specialized tasks.

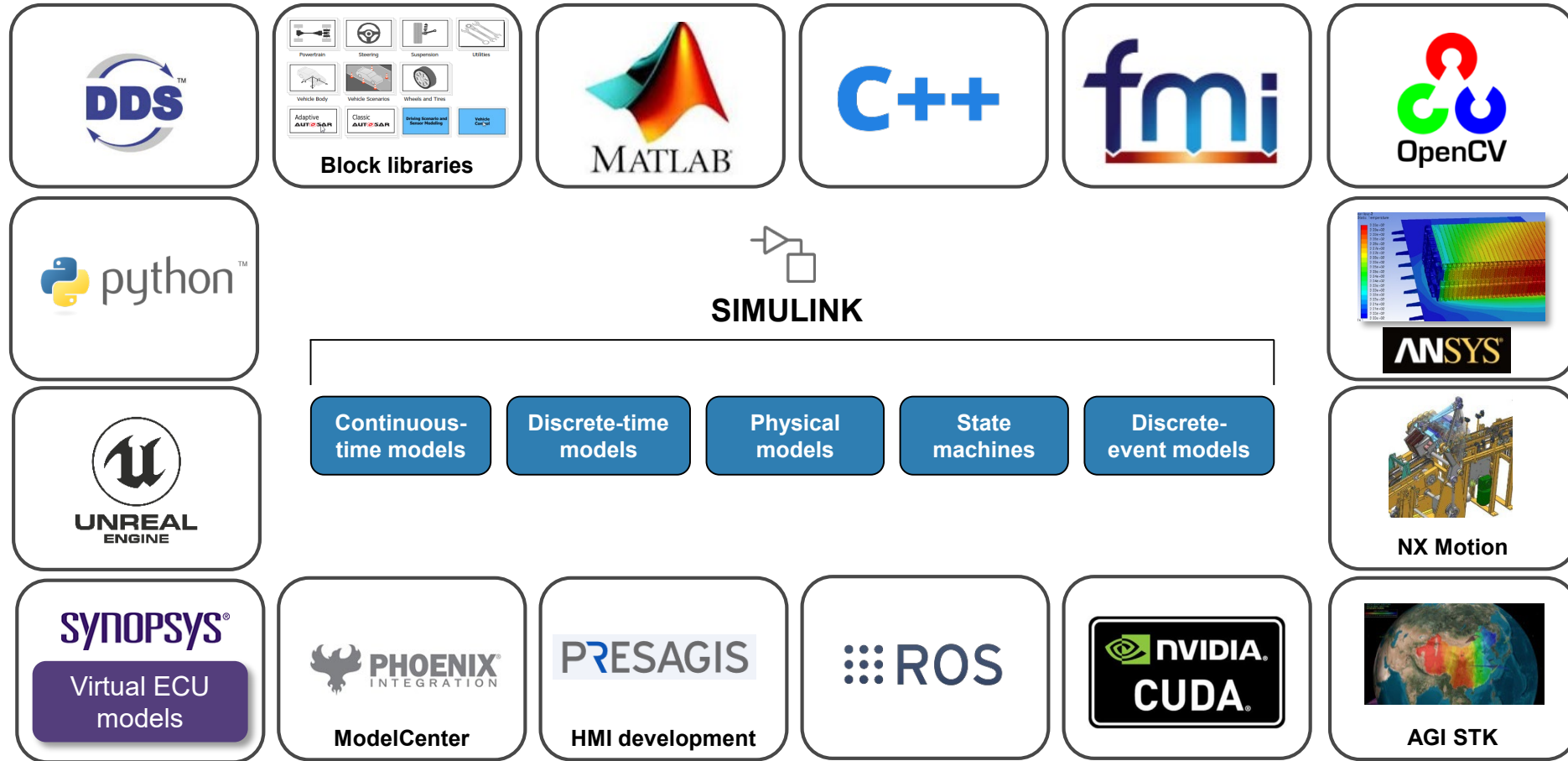
## Satellite Communications Toolbox





# System Modeling and Simulation

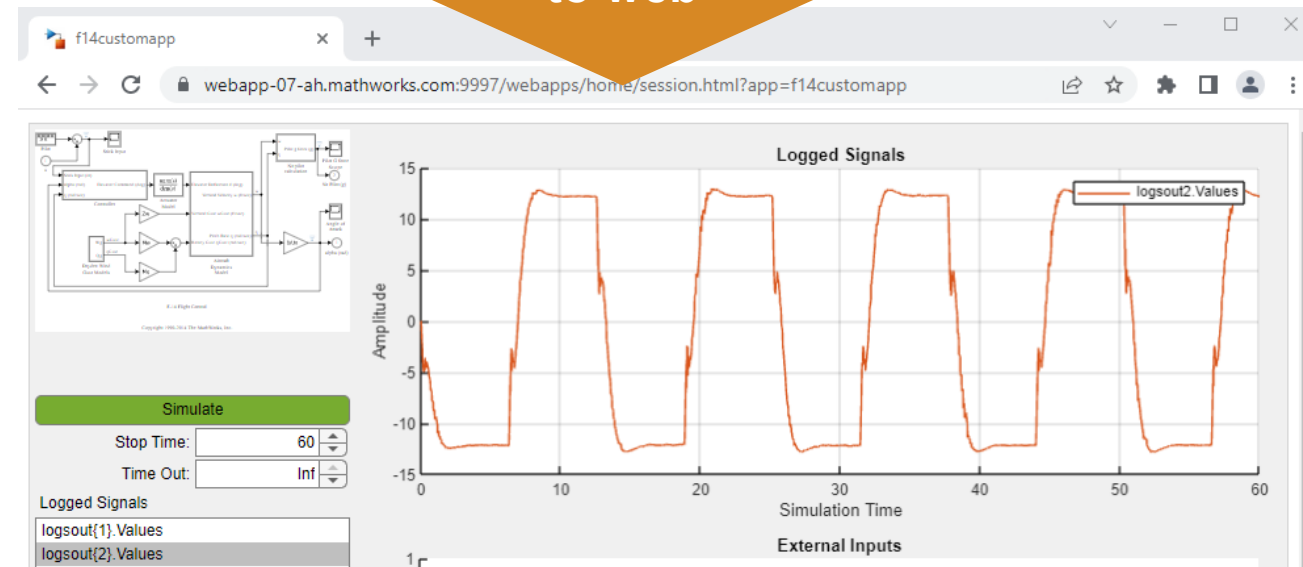
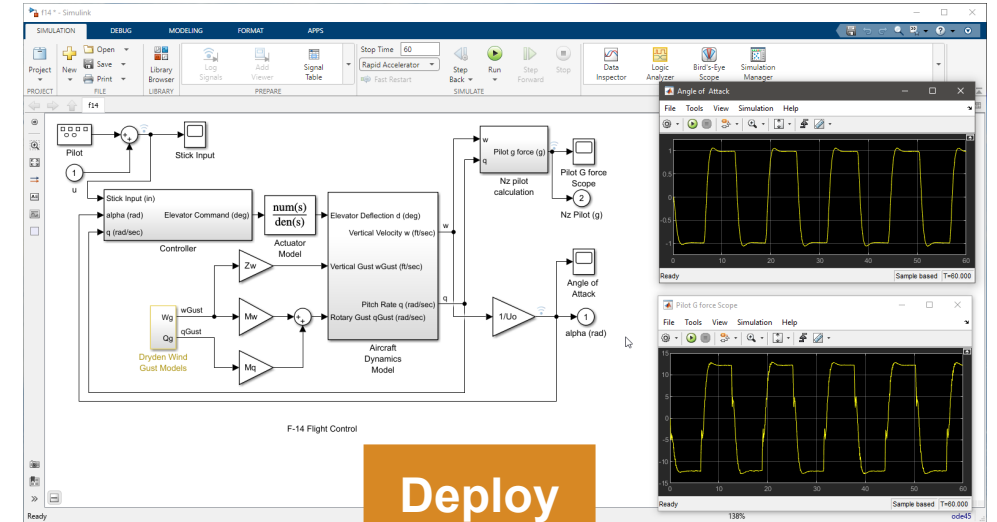
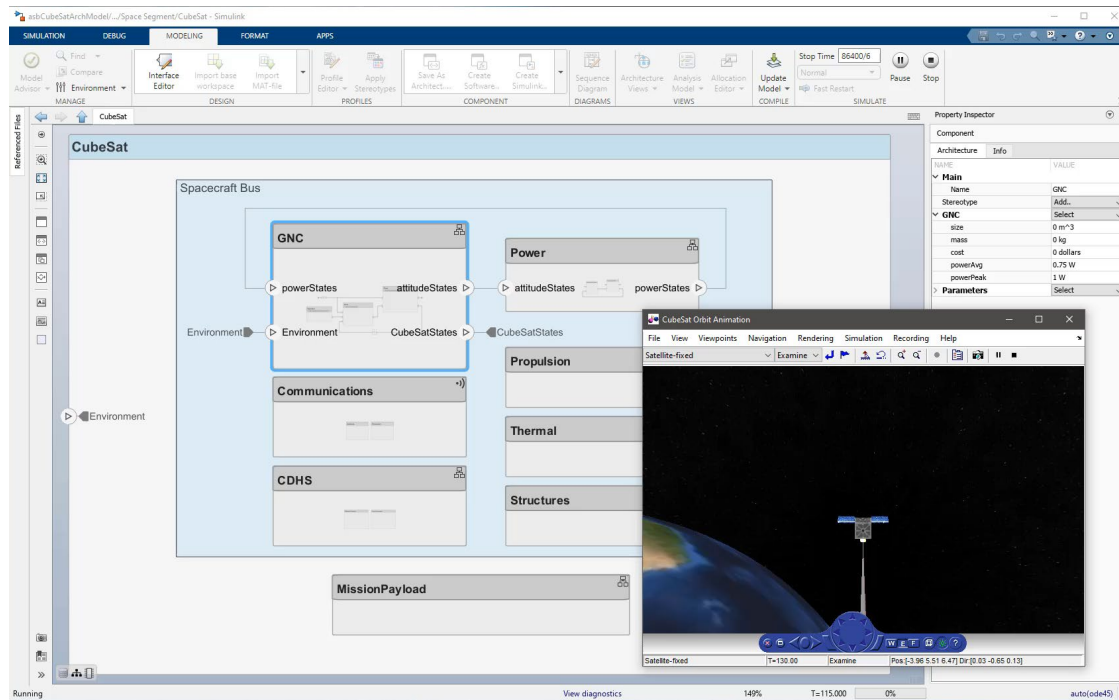
Ecosystem with 100+ third-party tools and languages



# Come and visit our booth

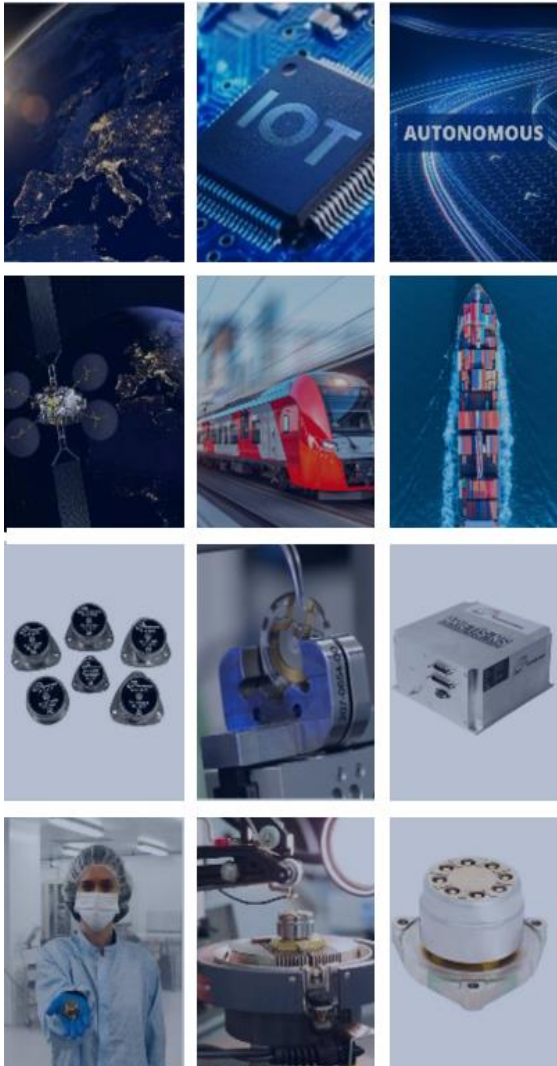
(2) Deploy your simulations with automatically generated Web Apps in a secured intranet/environment or FMI

(1) MBSE to model and simulate the mission of a Cubesat



# InnaLabs

is a European Technology Developer and Manufacturer of High-end Inertial Sensors for Space, Aerospace & Defense and Future Emerging Technologies



- Established in October 2011., **InnaLabs Ltd.** is a privately-held **Irish limited company**, with **HQ in Dublin, Ireland.**
- InnaLabs researches, develops, designs, manufactures, and **sells high-performance inertial sensors & systems** currently for the space and aerospace markets (gyroscopes, accelerometers, systems). InnaLabs gyros and accelerometers are widely used in land, marine, and aerospace applications.
- InnaLabs **CVG Technology** has already over **2.5 million flight hours** in Space in a LEO application as an off-the-shelf solution for a new space application.
- **InnaLabs** has successfully developed relationships with large European Space Prime manufacturers, including ESA, Airbus, and Thales Alenia Space to **develop the next generation space products for both institutional and commercial missions**, including **New Space.**
- **ARIETIS** and **ARIETIS-NS space gyros** have already been selected for a number of ESA missions (PLATO, LSTM, ARIEL, HERA) as well as a number of commercial platforms for both Earth Observation and Telecom applications.
- **AQUILA:** First European Space Accelerometer. Due to the successful introduction of the Q-Flex family of accelerometers, InnaLabs was awarded the development of the first ever deep space accelerometer to be manufactured in Europe.

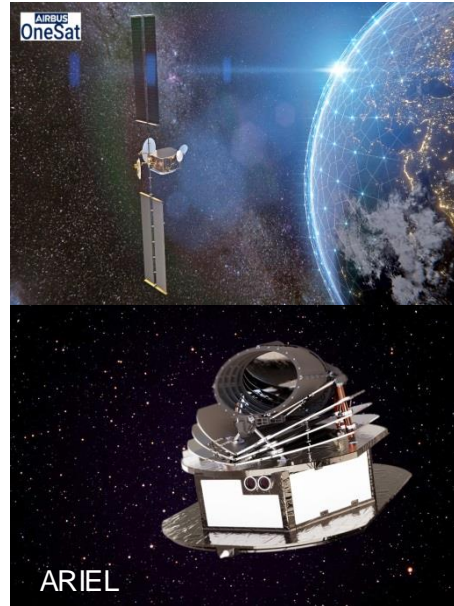
# InnaLabs space Products



## GYROS



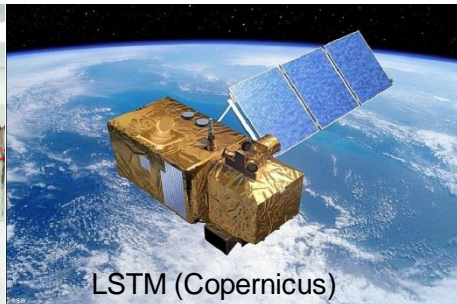
**InnaLabs gyros have already accumulated >2,500,000 hours in flight**  
**ARIETIS: Rad-Hard**  
**ARIETIS-NS: upscreened COTS**  
**CVG-NS: full COTS solution**



ARIEL



PLATO Spacecraft

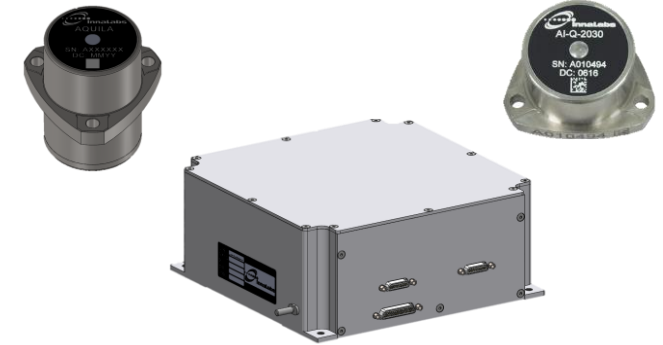


LSTM (Copernicus)



HERA

## ACCELEROMETERS



**InnaLabs accelerometers are TRL9 in launchers.**  
**Rad-Hard version being developed**



**IMU for space applications being developed**

# FOSTERING EUROPEAN TECHNOLOGY NON-DEPENDENCE

## ESA-funded development in Ireland eliminates dependence on export-restricted tech

Development of AQUILA, the first and only European radiation-hardened high accuracy accelerometer for space use, was funded by ESA's Science Core Technology Programme to provide a European navigation solution for upcoming missions, with enhanced applications on Earth



know.space

### EXPANDING NATIONAL INDUSTRIAL CAPABILITIES

- Highly-specialised **critical space technology**
- Fosters **broader participation** in ESA science missions
- **Commercialisation** revenues from export sales
- Building **wider Irish expertise** and **training opportunities**

### BUILDING A EUROPEAN CHAMPION

- **Sole European provider** of rad-hard high accuracy accelerometers
- Enhanced competitiveness in **high-end terrestrial accelerometer market** (worth €250 million by 2026)
- Supports further expansion into space sector for InnaLabs, now representing **30% of company revenues**



RADIATION-HARDENED  
HIGH ACCURACY  
ACCELEROMETER



PLATO  
ESA's exoplanet hunter



ARIEL  
ESA's exoplanet investigator



ESA'S VEGA-C &  
FUTURE MISSIONS



ACCELEROMETERS  
FOR EARTH

### FACILITATING FUTURE EUROPEAN MISSIONS

- Enables **future space science missions** and supports **longer lifespan** of spacecraft
- European-developed solution provides **technological non-dependence** from export-restricted technology
- Increases European competitiveness with **high accuracy**, restriction-free, **cost-saving** solution for **space and terrestrial users**

SCIENCE  
SPILLOVERS



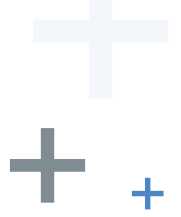
# 3D PLUS products around FPGAs – ADCSS 2022



Wissam Durand Moullem

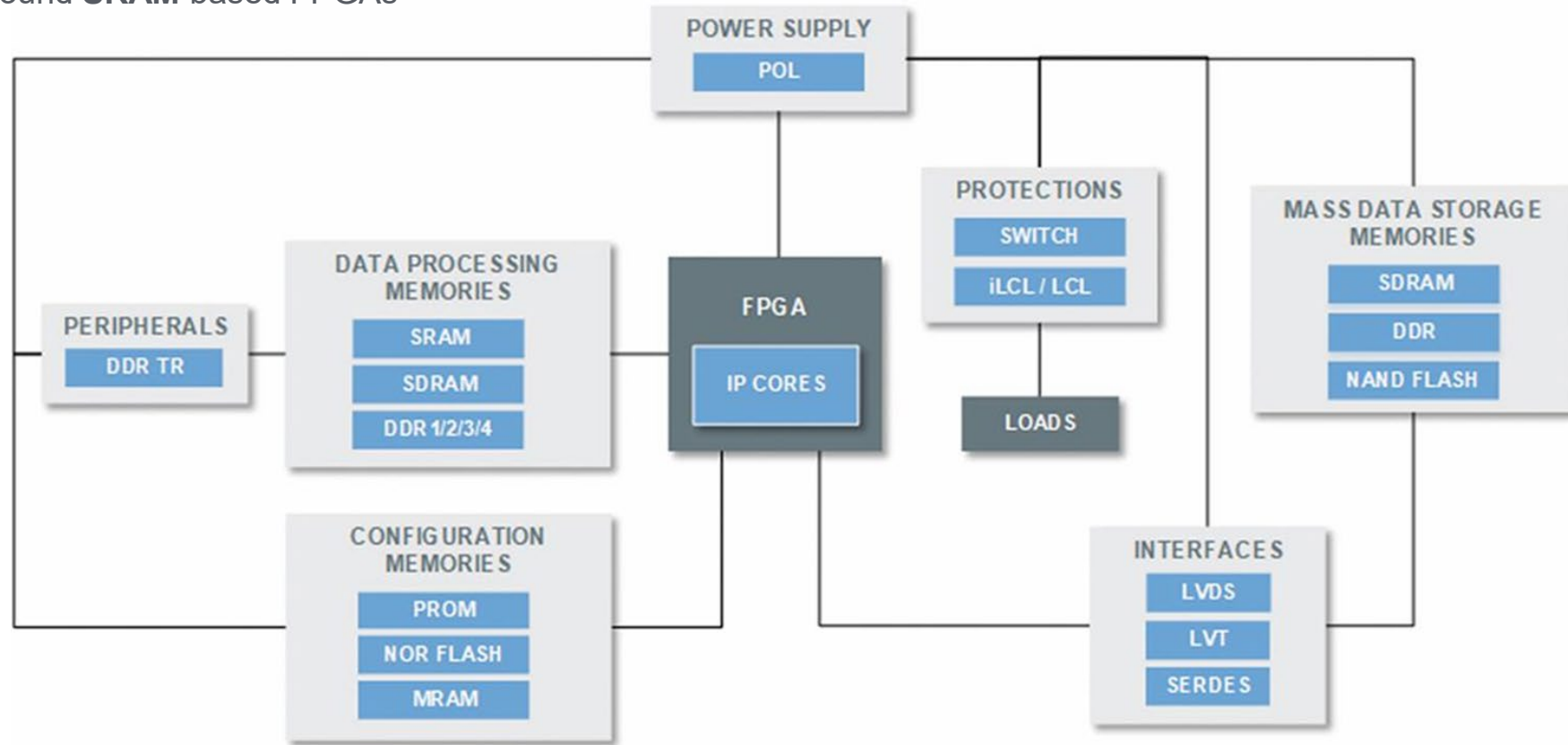
25 October 2022

Estec

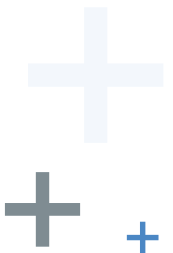


# 3D PLUS Portfolio

3D PLUS products around **SRAM** based FPGAs



- Our strategy is to provide the necessary functions/building blocks to accompany  $\mu$ processors and FPGAs with:
  - High Performance,
  - High Reliability,
  - High Miniaturization,
  - Radiation Tolerance,
  - Worldwide delivery guarantee (ITAR Free).





## High density Configuration Memory



### Key Features

- 256 Mb density
- Triple Modular Redundancy (TMR) integrated
- Power management embedded
- 3.3V supply voltage
- ECC\_Flag
- SEE Immune

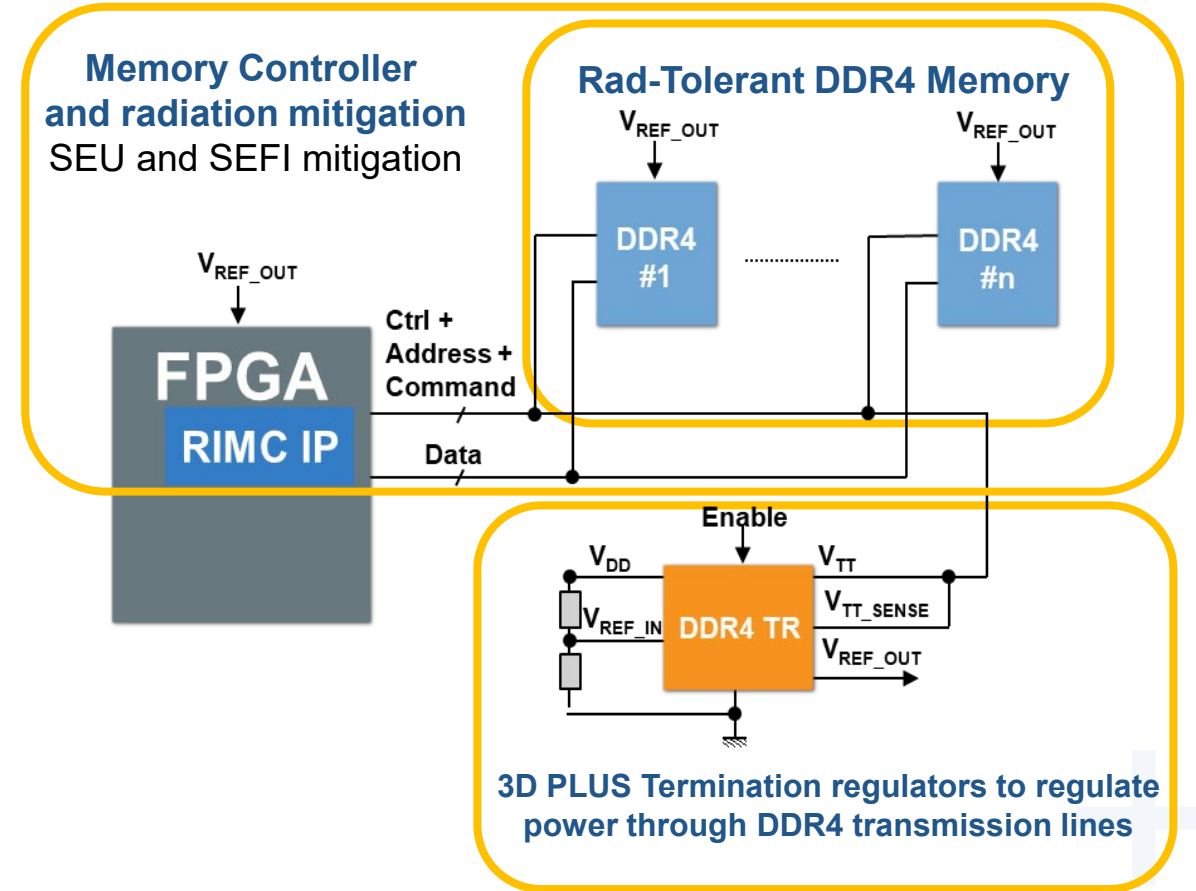
## Configuration Memory Boot Manager



### Key Features

- Safely boot large SRAM FPGAs
- Store multiple bitstreams as well as OS (64Gbit internally)
- Self scrub of internal memories,
- Guaranteed data integrity
- SPI, SelectMap, UART interfaces
- Inflight reconfiguration

## Full Space Qualified DDR4 Solution





# Company Overview

# NanoXplore Overview

- **Created in 2010** by three veterans of semiconductor industry with long experience in design, test and debugging of e-FPGA cores. (*MetaSystem, M2000, Abound Logic, then NX*)
- **2014 : start of FPGA**
- **2016 : SoC FPGA activities**
- **Fabless** semiconductor company located in France
  - Sevres : Headquarter – more than 70 R&D engineers
- The company is focusing on developing rad-hard FPGA qualified for space applications
- NX fully supported by



# Products offer Rad-Hard FPGAs family

