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FROM **SCIENCE**
TO **NEXT SPACE**
MINIATURISED
INSTRUMENTATION

**CENTRE
SPATIAL**
UNIVERSITAIRE
DE GRENOBLE



In France, space is an industry of the future. The miniaturisation of satellites represents a paradigm shift with the potential to unlock major innovations and open up the entire sector to new players.

The CSUG unites Grenoble's ecosystem to focus on miniaturised space instruments and the processing of space data in the name of greater contribution to science, preparing students for careers of the future in New Space.

Centred around innovative projects with identified scientific and technological opportunities, the CSUG takes an original approach to teaching at the University. Created in 2015, the CSUG aims to begin developing one new satellite per year.

OFFERING STUDENTS A PATH INTO SPACE

The CSUG provides a unique opportunity when it comes to training young people for a demanding but promising sector using the 'Learning-by-Doing' approach, involving students from the **Université Grenoble Alpes** and **Grenoble INP** at the heart of its projects.

The CSUG's education offering, backed by the **Université Grenoble Alpes Foundation**, is designed for students to work in cross-disciplinary teams under the supervision of professors, lecturers and researchers, as well as industry experts and sponsors. Each year, 100 students take part in the development of nanosatellites, from the design phase to pre-launch testing. The practical and expertise-based curriculum helps them build key skills that meet the real needs of businesses operating in the space sector.

WHAT IS A NANOSATELLITE?

First developed in the United States, these satellites weighing less than 30 kg were initially used for their educational value.

However, their scientific and technological advantages are now widely recognised. Nanosatellites are lightweight, energy efficient and inexpensive, helping to make the space sector more accessible.

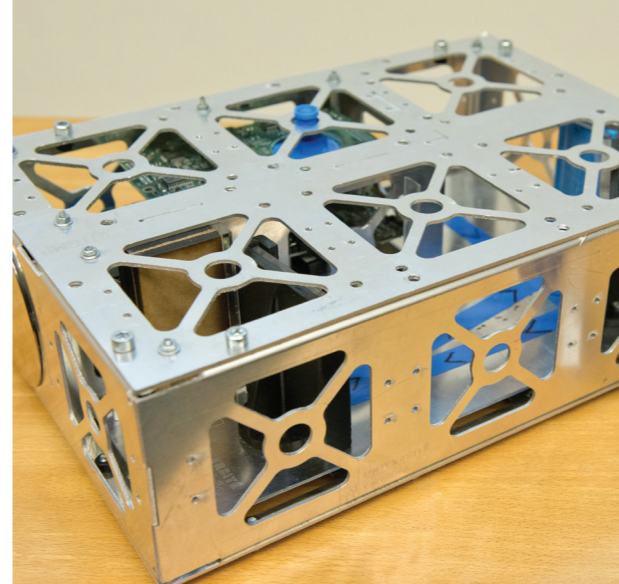
The size of a shoebox, they will be capable of generating data with the same quality as that of standard satellites.

FACILITATING AMBITIOUS RESEARCH PROGRAMMES

Miniaturised space instruments offer scientists new opportunities for observation.

Starting in 2018, the CSUG's first satellites will be launched into orbit.

They will produce a wide variety of scientific feedback, be it for space weather, Earth observation or fundamental physics – all fields in which Grenoble's scientific community is highly skilled.



Model of the ATISE instrument

TAKING ADVANTAGE OF LOCAL EXPERTISE

The main technological complication for nanosatellites lies in the miniaturisation of instruments.

Grenoble has developed undeniable know-how thanks to three main factors:

- exceptional miniaturisation expertise,
- strong cooperation between academic and industrial players,
- top-quality innovative scientific research.

ACCELERATING TECHNOLOGICAL DEVELOPMENTS

- Positioned as an interface and a portal, the CSUG draws on strong local expertise and the excellence of Grenoble's laboratories. As a result, it accelerates the development of miniaturised technology in Auvergne-Rhône-Alpes and serves to unite the different stakeholders in the region.



Artist's impression of the ATISE satellite in flight

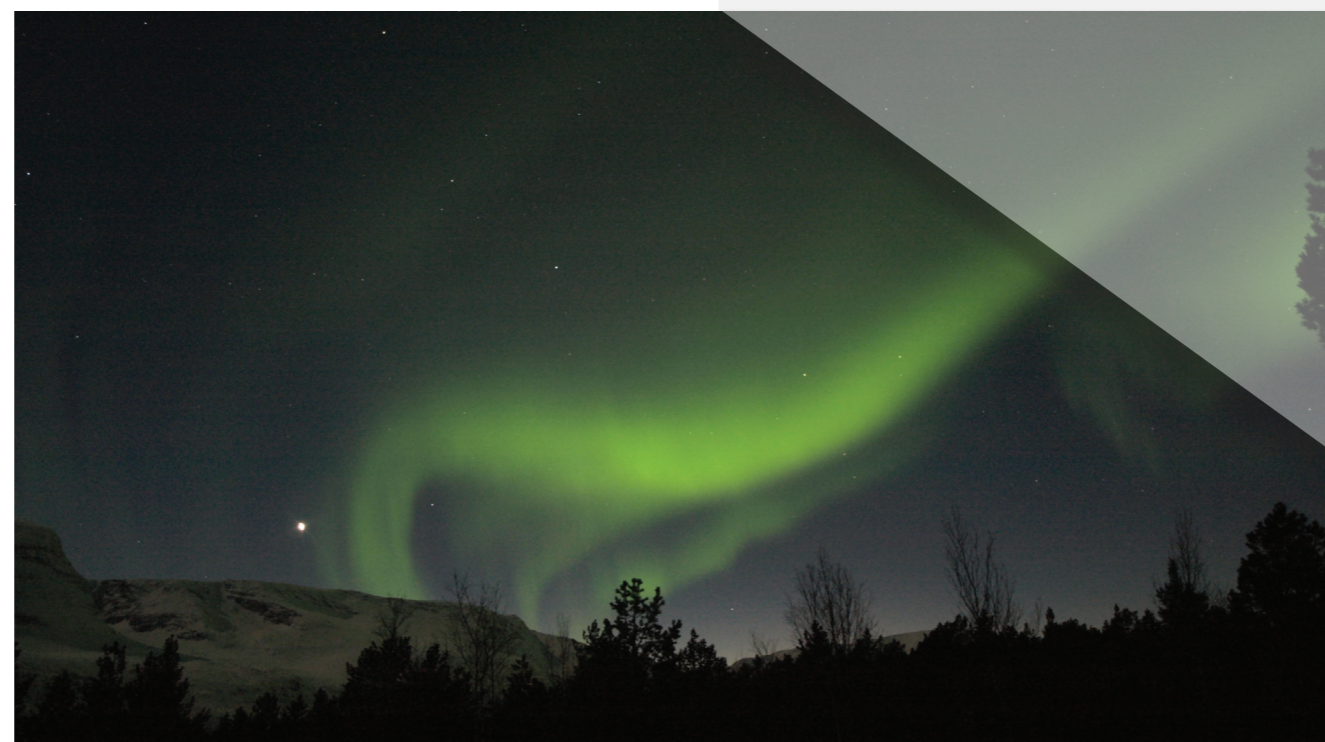


Students from different courses working around the model

SUPPORTING AN INDUSTRY OF THE FUTURE

- By preparing students for changes in the space sector, the CSUG is strengthening employability in the region.

Through the involvement of local business professionals alongside the students, it is creating a dynamic and a bridge for skills sharing. It also supports start-ups and contributes to promoting innovation and employment for the future.



Mission to observe the Northern Lights – Skibotn, Troms county, Norway – March 2017

THE CSUG'S FIRST TWO PROJECTS

Since September 2016, the CSUG, based at the PHITEM UFR, has been developing two space projects:

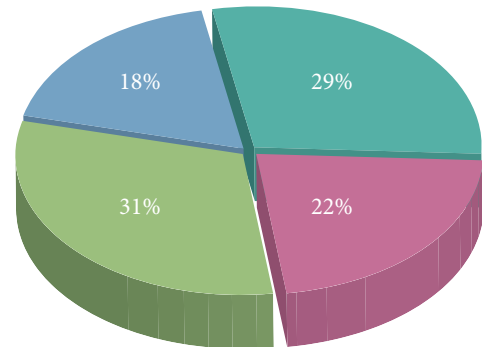
- ➔ ATISE/AMICAL, in the field of space weather, in collaboration with the Toulouse University Space Centre and Russian university professors.
- ➔ NanoBob, in the field of quantum communication, in collaboration with IQOQI of the Austrian Academy of Sciences.

The CSUG also pursues instrument development activities with its institutional and private partners.

At the national level in France, the CSUG enjoys technical support from the CNES through various programmes, including JANUS, and several experiments are currently in codevelopment with the teams in Toulouse.

CSUG OVERALL BUDGET BREAKDOWN 2016–2020

- Sponsorship requirement for the education component (€1.5 million) in cash, skills and equipment
- Contribution from supporting bodies (2,5 M€)
- Collaborations (2,7 M€)
- Fundraising (1,9 M€)



The overall budget includes funding for the platform, student education, the ATISE and NANOBOP projects and instrument development.

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