



# ASTG

# AVES II 01

Team Name **Aerospace Team Graz**  
 Rocket Name **AVES II**  
 Category **S3 (3 km solid SRAD)**  
 University **Technical University Graz**  
 Country **Austria**  
 Team ID **01**

## Introduction and Project Goals

Since its founding on late 2019, the Aerospace Team Graz grew to an interdisciplinary team of about 80 students from 15 different fields of study. After the launch of ASTG's first rocket, called AVES, last year at EuRoC 2021, the team introduces the brand new successor model, **AVES II**.

- The main **project goals** are to
- design & build as much possible in-house (SRAD)
  - successfully launch our rocket,
  - reach the target apogee of 3000 m AGL as accurate as possible
  - safely land and recover AVES II

Additionally, this mission and the European Rocketry Challenge itself will help the team members to gain experience, to expand their knowledge and to make new friends and colleagues from all over Europe.

## Mission Objectives

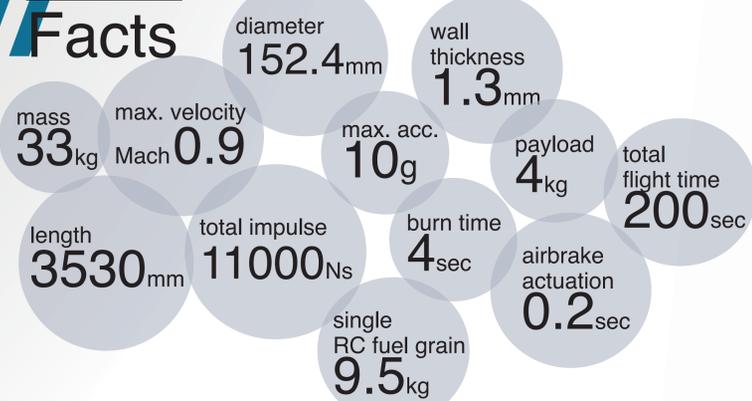
**CubeSats** create & build a sustainable launch platform to reach 3000 m for a 4 kg payload

**NewSpace** dynamic team capable of fast iterations & collaborations with young companies

**Reliability** advance sustainable solid propulsion for sounding rockets

**Space4All** easy entry into space sector for all levels of education

## Hard Facts



## Aerostructure Subsystem

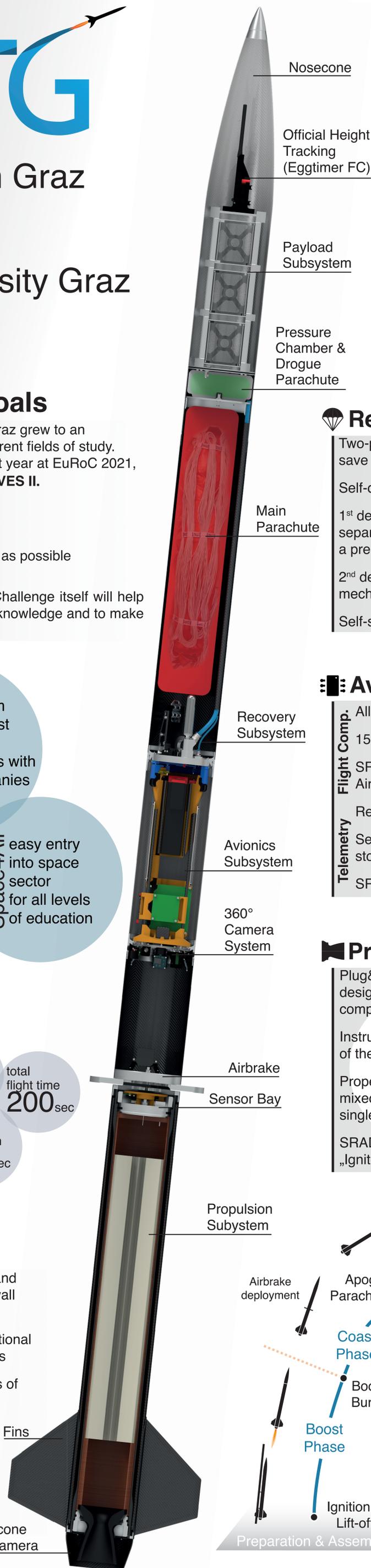
Materials: Carbon Fibre Reinforced Polymer (CFRP) and glass fibre (RF-transparent sections) sections with a wall thickness of ~1.3 mm connected by RADAX joints

Airbrake: two plates driven by a servo can create additional aerodynamic drag with an actuation time under 200 ms

Fins: made of CFRP Prepreg, each fin has a thickness of 4 mm and is filled with foam to add stiffness

Retractable Rail Buttons: spring-loaded rail buttons coated in PTFE retract into the hull after leaving the launch rail

Riblet Foil: most of the rocket's hull is covered with a shark-skin-like riblet foil to reduce the total drag by 2%



## Payload Subsystem

Compartment for three 1U CubeSats designed for up to 4 kg payload mass total

- easily interchangeable
- telemetry possible

### EuRoC 2022 Payload:

Project **Buffalo** (HTL Neufelden school, jm\_space): Rocket Flight Computer

Project **Accipiter** (HTL Pinkafeld school): Rocket Flight Computer

Bachelor Thesis project **Hawfinch** (ASTG): Cosmic Ray Detector and Camera

## Recovery Subsystem

Two-parachute dual-deployment recovery ensures safe landing

Self-designed & redundant deployment mechanisms:

1<sup>st</sup> deployment: cold gas cartridges used for nose cone separation and drogue parachute deployment at apogee; a pressure chamber is used to minimize gas usage

2<sup>nd</sup> deployment: redundant linear actuator releasing mechanism used to deploy the main parachute

Self-sewn drogue & main parachute with deployment bag

## Avionics Subsystem

**Flight Comp.** All 13 different PCBs were designed and soldered in-house

15+ Sensors spread throughout the rocket (excl. payload)

SRAD Real-Time-Operating-System with Airbrake Control System in Coast Phase

Redundant wireless links with high sending power (2W & 7W)

Self-developed package protocol with visualization and storage on ground

SRAD Ignition System with high safety

## Propulsion Subsystem

Plug&Fly: reusable hardware, easy and self-centering design allows quick rocket integration and ensures flight computer connection

Instrumentation: pressure and temperature measurements of the combustion chamber during flight

Propellant: potassium nitrate + sorbitol (Rocket Candy) mixed, melted and casted directly into the insulation in a single „finocyl“ shaped fuel grain

SRAD Ignition: „Dome Sprayer“ igniter inserted with „Igniter Lift“

## Flight Cycle & Mission Events

