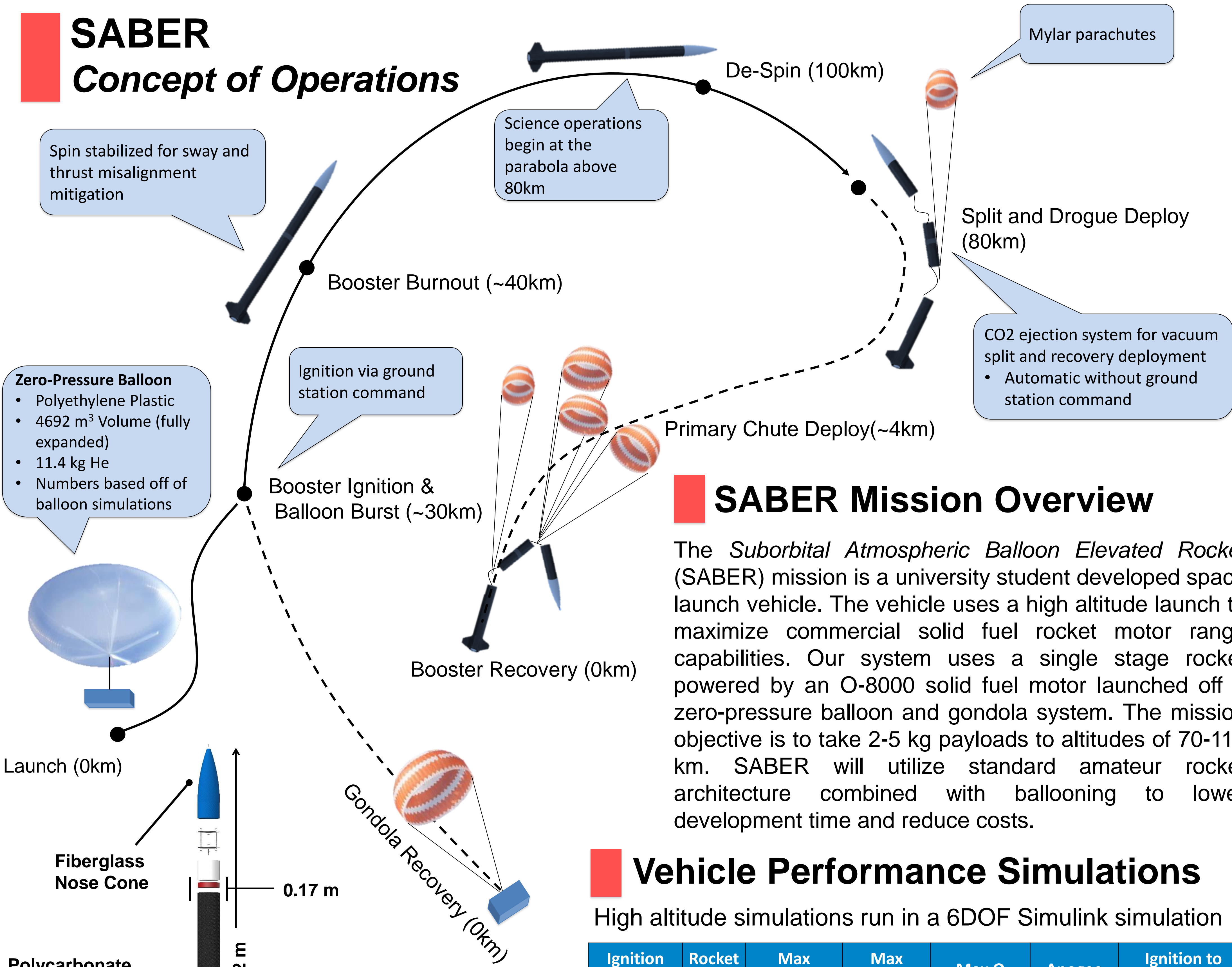


Overview of the SABER Mission and Launch Vehicle Design

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SABER Concept of Operations



SABER Mission Overview

The *Suborbital Atmospheric Balloon Elevated Rocket* (SABER) mission is a university student developed space launch vehicle. The vehicle uses a high altitude launch to maximize commercial solid fuel rocket motor range capabilities. Our system uses a single stage rocket powered by an O-8000 solid fuel motor launched off a zero-pressure balloon and gondola system. The mission objective is to take 2-5 kg payloads to altitudes of 70-110 km. SABER will utilize standard amateur rocket architecture combined with ballooning to lower development time and reduce costs.

Vehicle Performance Simulations

High altitude simulations run in a 6DOF Simulink simulation

Ignition Altitude	Rocket Mass	Max Velocity	Max Accel.	Max Q	Apogee	Ignition to Apogee
25 km	44 kg	1160 m/s	305 m/s ²	25880 N/m ²	92.3 km	125 s
30 km	44 kg	1165 m/s	310 m/s ²	13960 N/m ²	100 km	125 s
35 km	44 kg	1168 m/s	312 m/s ²	7504 N/m ²	107 km	125 s

Costs

Item	Cost (\$)
Motor	8,000
Helium	175
Balloon	100
Rocket	3,000
Gondola	1,000
Total	12,275

Conclusion

SABER's mission concept has the capabilities to put space within the reach of student engineering teams. The platform combines ballooning and rocketry to create a space launch vehicle that bypasses development of propulsion and cuts costs using commercial motors and amateur systems. The SABER mission plan is to fly in 2019 with the start of hardware prototyping this semester.

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