

Project Title: RebelSat-1

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RebelSat-1 (RS-1) is intended to be the first of many CubeSat missions at the University of Nevada, Las Vegas (UNLV). RS-1 has two main goals. The first and primary goal is the testing of a catalytic thruster utilizing an aerospike nozzle. The aerospike geometry was first discussed in the 1960s, promising increased vacuum efficiency, automatic altitude compensation, and lower mass and volume (when compared to conventional DeLaval nozzles). These advantages are ideal for small satellites and CubeSats, but inherent design flaws cause destructive overheating when spike nozzle engines are operated for any significant length of time. This has prevented their use on large-scale rockets, such as those used for orbital insertions. However, recent research conducted has indicated that small scale spike nozzles may have potential for use in short burst operation — especially when it comes to the realm of CubeSats. RS-1 will take the first step in investigating this technology through the construction of a monopropellant aerospike nozzle thruster. This is a proof-of-concept mission that allows the testing of many major components that would be required to construct a more robust aerospike nozzle thruster. If this and subsequent missions are successful, the door may open for future CubeSat missions that require high orbital maneuverability, long term station-keeping, and the ability to avoid other objects in orbit.

The secondary goal of RS-1 is to establish a CubeSat platform for UNLV. Currently, the State of Nevada has no CubeSat foundation, and Nevada is one of the few remaining states that has not flown a CubeSat before. Through this organization and program, we want to inspire the students at UNLV and throughout Nevada to consider and pursue space exploration. In all, RebelSat-1 is a CubeSat project with goals of not only advancing space engineering, but also Nevada's involvement in space research.