



Experimental Smartphone- synchronized Ground station Grid ESG-Grid

University of Louisiana at Lafayette

Home of the successful

CAPE 1 and CAPE2 Missions

Based upon Mobile Grid Computing Research,

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The Problem

CubeSat stabilization is challenging

Spin rate and Axes are difficult to control

CubeSat

Nulls may interrupt the link and the message or a portion may be dropped

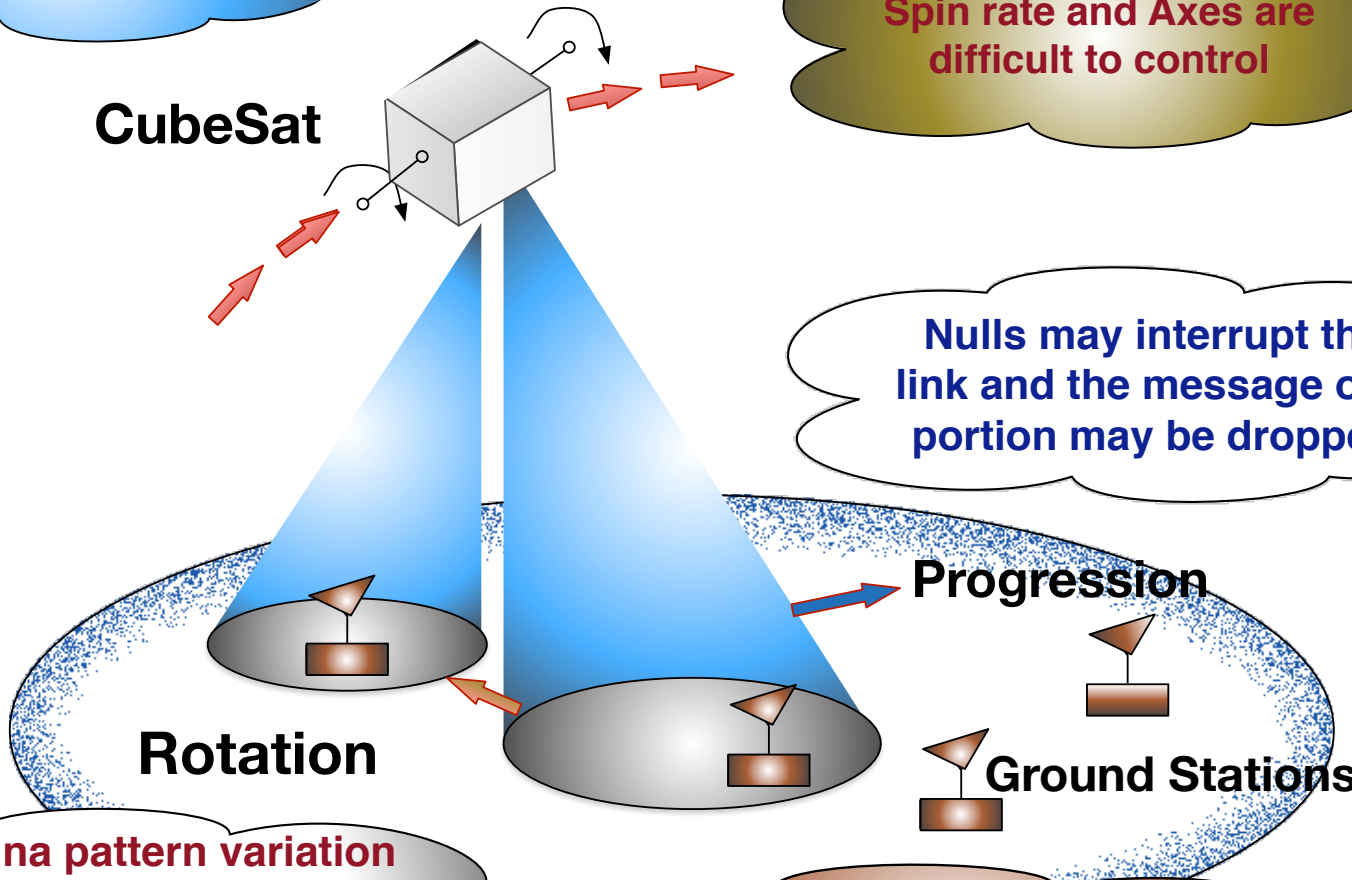
Progression

Rotation

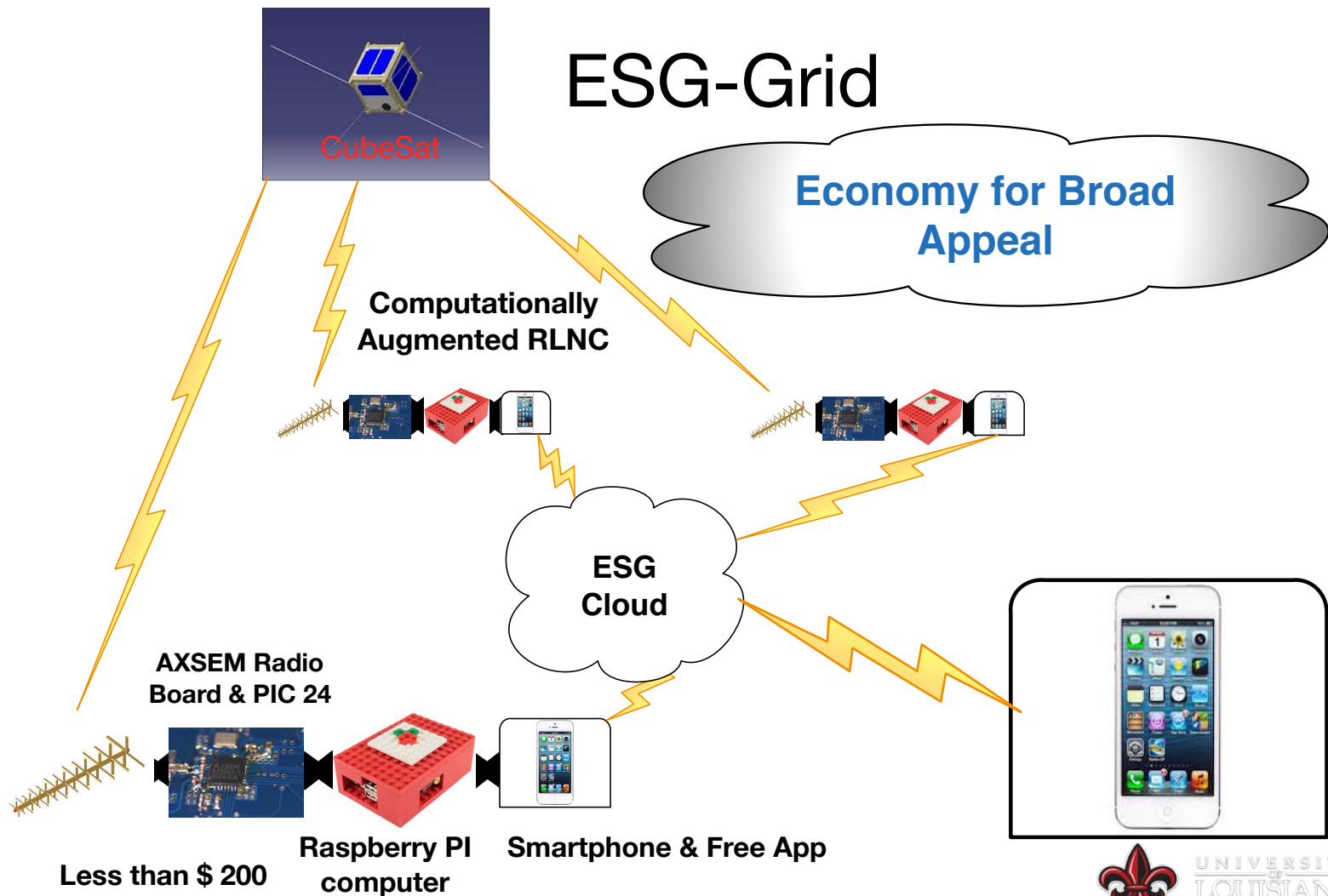
Ground Stations

Antenna pattern variation at ground stations is problematic for efficient communications

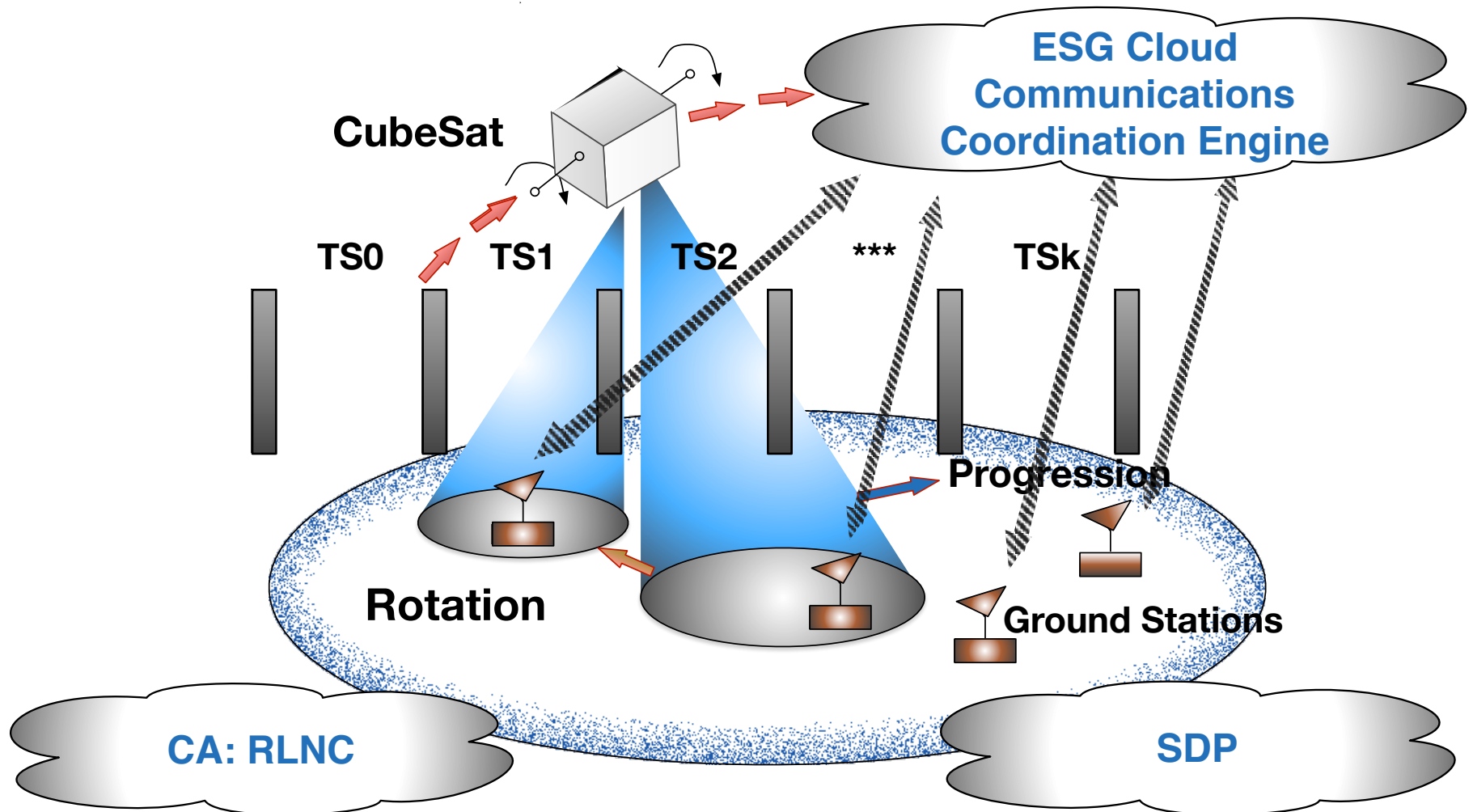
Relatively Short Communications Window



Experimentation: Vehicle for Increased Educational Outreach

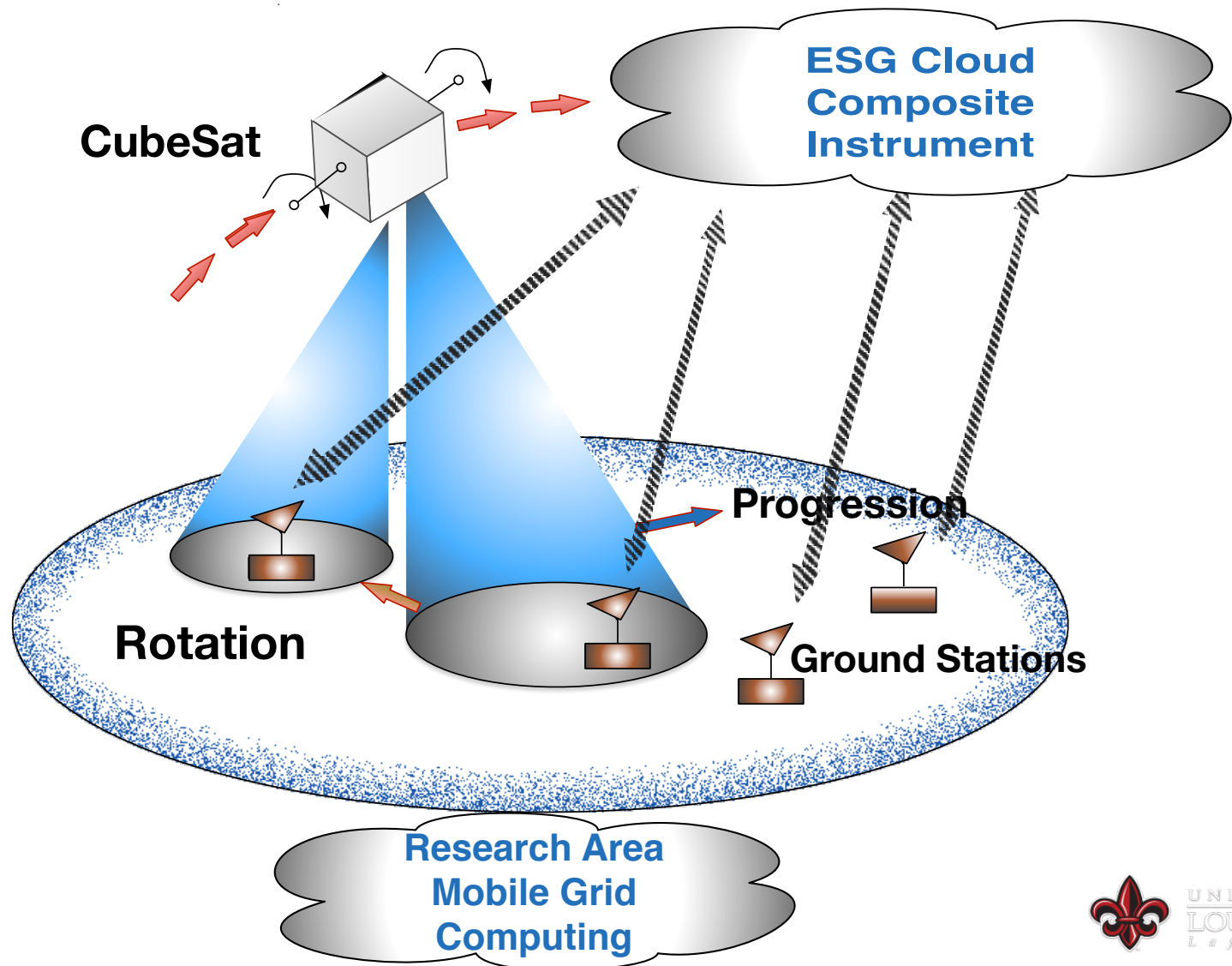


Experimentation: Efficient Communications

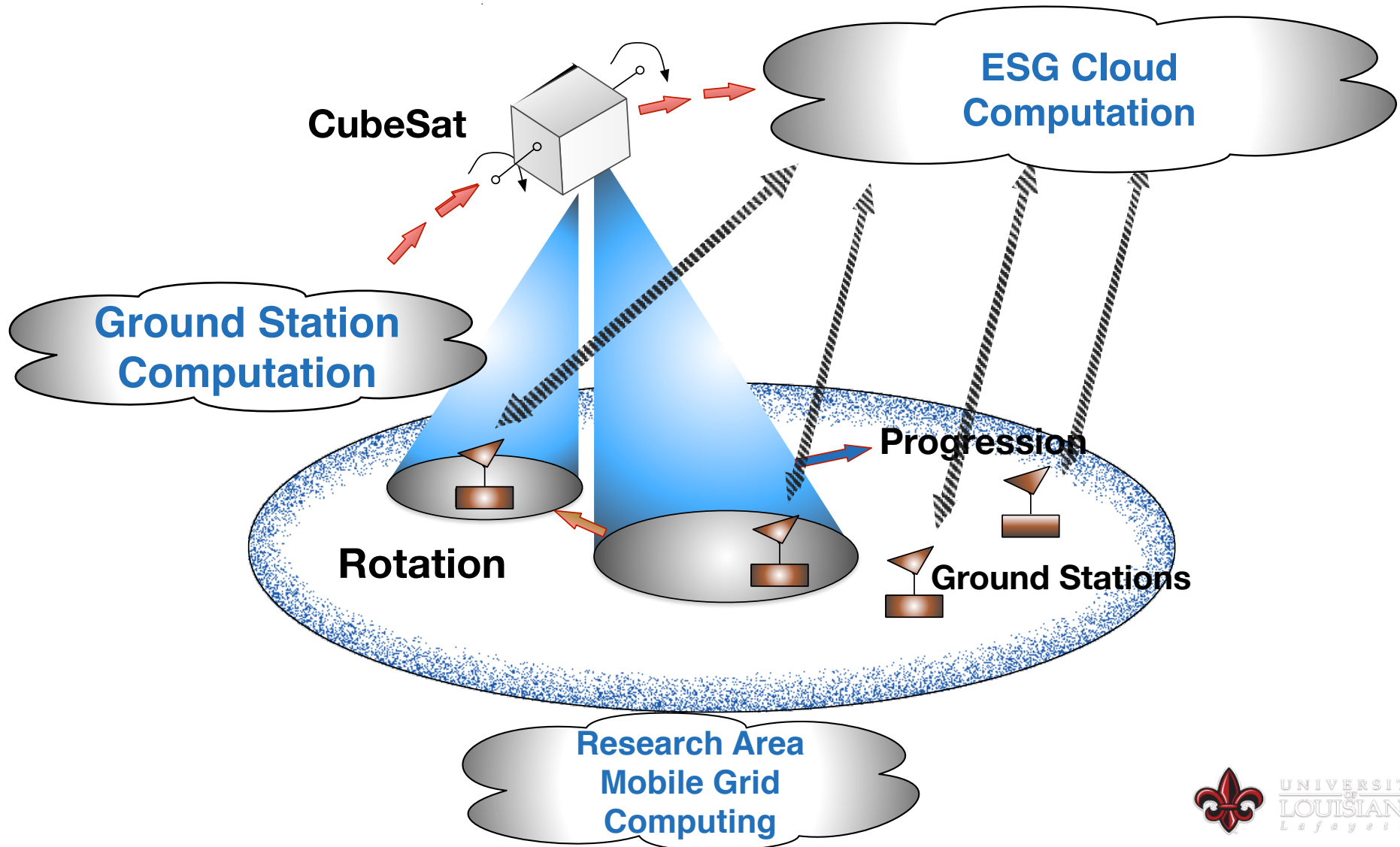


P_0	P_1	****	P_k	****	****	****	P_m
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Experimentation: Capture & Predict Dynamic Behavior



Experimentation: Distributed Fault-tolerant Computation Coordination



Summary

ESG is itself an experiment

Problem: Relatively Short Communications Window

Problem: Spin rate and Axes are difficult to control

Q: Can economy, ease of use, and contemporary broad appeal be achieved?

Q. What can we learn from the ESG Cloud Composite Instrument as a dynamic modeling / radio coverage prediction tool?

Q. Can a practical ESG Cloud Communications Coordination Engine be achieved?

Protocol Development?

ESG Cloud Computation; distributed / centralized fault-tolerant tradeoff

Evaluation of SDP?

Evaluation of CA: RLNC?

Ground Station Computation

Cloud Computation

Research Area Mobile Grid Computing

References

- [1] P. Darby and N. Tzeng, “Decentralized QoS-Aware Checkpointing Arrangement in Mobile Grid Computing,” *IEEE Transactions Mobile Computing*, vol.9, no.8, Aug. 2010, pp.1173-1186.
- [2] P. Darby and N. Tzeng, “Peer-to-Peer Checkpointing Arrangement for Mobile Grid Computing Systems,” Proc. of *the 16th IEEE Int’l Symposium on High Performance Distributed Computing (HPDC-16)*, June 2007.
- [3] S. Chachulski, M. Jennings, S. Katti, and D. Katabi, “Trading Structure for Randomness in Wireless Opportunistic Routing,” *Proc. of the 2007 Conference on Applications, Technologies, Architectures, and Protocols for Computer Communications (SIGCOMM 2007)*. Aug. 2007, pp. 133-144.