1. **Research Title**: Exploration of Magnetization Dynamics in Ferromagnetic and Antiferromagnetic Materials

2. **Individual Sponsor:**
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3. **Academic Area/Field and Education Level:** Physics, Chemistry, Materials Science Engineering, Electrical Engineering, MechanicalEngineering, Chemical Engineering (Ph.D. level)

4. **Objectives:** Develop materials, characterization techniques, and devices which explore and capitalize on the rich spectrum of behavior in ferromagnetic and antiferromagnetic materials systems for novel high frequency technologies.

5. **Description:** Magnetic materials feature a rich spectrum of excitations and methods for tailoring their response to a variety of input and output signals. With the increasing demands on performance of high frequency devices operating in the GHz and THz regimes, there is an opportunity for magnetization dynamics to be integrated into or developed concurrently with conventional electronic based high frequency devices. While ferromagnetic and antiferromagnetic materials hold much promise for these applications due to their unique dispersions and methods for controlling their properties, many fundamental aspects relating to the dynamics of these materials are poorly understood. It is desirable to investigate new schemes for leveraging the diverse array of effects in magnetic materials for novel device concepts. For example, magnonic materials can be used to control the frequency response of a passive magnetic filter, voltage controlled magnetism can be incorporated for tunable devices, and magnetoelastic waves can be used to enable small form factor and yet high frequency operational devices. Understanding and utilizing spinwaves and their magnon-magnon, magnon- phonon, and magnon-photon interactions can lead to new high performance, low weight and power, and novel operating modalities for high frequency devices. AFRL is currently soliciting proposals for well qualified individuals with expertise in magnetic dynamics and spinwaves in both ferromagnetic and antiferromagnetic materials, who can propose relevant experiments in exploring the fundamental interactions associated with these excitations and subsequent device concepts relevant for Air Force applications in high frequency electronics.

6. **Research Classification/Restrictions:** Unrestricted

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