NMR AT ULTRA HIGH MAGNETIC FIELD: OPPORTUNITIES AND CHALLENGES FOR BIOLOGICAL AND MATERIALS SOLIDS. **Chad M. Rienstra**, University of Wisconsin-Madison, Department of Biochemistry and National Magnetic Resonance Facility at Madison (NMRFAM), 433 Babcock Dr., Madison, WI 53706, United States. (crienstra@wisc.edu)

In this lecture, I will describe the recently upgraded capabilities for solid-state NMR (SSNMR) at NMRFAM, including the first GHz-class magnet in North America dedicated to SSNMR. Since 2020, we have installed and/or upgraded 7 spectrometers (3 600 MHz, 2 750 MHz, 900 MHz, and 1.1 GHz) with custom magic-angle spinning probes designed for biological and materials solids applications. The custom probes include: Varian/Phoenix compatible 1.2 mm, 1.6 mm, 2.5 mm, 3.2 mm and 5.0 mm probes with broadband capabilities (HFXY including low-gamma option); and Black Fox probes with 1.6 mm (900 MHz and 1.1 GHz) and 2.5 mm (900 MHz) Phoenix stators, optimized for low E field and high ^{13}C detection sensitivity. I will highlight applications from my own research group, including structural studies of alpha-synuclein fibrils and the antifungal drug amphotericin B, as well as collaborative user projects at NMRFAM ranging from materials solids to high molecular weight proteins. The NMRFAM user facility is supported by U.S. National Institutes of Health (NIH) R24GM141526, technology development by NIH P41GM136463, and the 1.1 GHz installation is part of the Network for Advanced NMR (NAN) funded by the U.S. National Science Foundation (NSF) Mid-Scale Research Infrastructure grant number 1946970.