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Development of a high-field electron paramagnetic resonance spectrometer EKATERINA E. ROMANOVA, FRANKLIN H. CHO, VIKTOR STEPANOV, SUSUMU TAKAHASHI, University of Southern California — Electron paramagnetic resonance (EPR) spectroscopy is a powerful and versatile technique to study structure and dynamics of biomolecules. Structural investigations of biological molecules begin with site-directed spin labeling (SDSL). Using SDSL, a nitroxide spin label containing a stable unpaired electron is covalently attached at a specific site within a bio-macromolecule. The time resolution and the sensitivity of EPR spectrometer become higher when the system is operated at higher frequencies and magnetic fields. In addition, a fine spectral resolution obtained with a high-field EPR (HFEPR) enables us to study details of the conformation in biological molecule by determining the orientation of a spin-label or the relative orientation of two spin-labels embedded in the molecule. In this presentation, we will report the development of a 115/230 GHz continuous wave (cw) and pulsed EPR spectrometer at USC. The spectrometer is based on a 700/100 mW solid-state source at 115/230 GHz respectively, a 12-Tesla magnet and a superheterodyne detection system. The system also has the 2nd synthesizer for double electron-electron resonance (DEER) spectroscopy. HFEPR measurements with spin-labeled CS DNA will be discussed.

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