

## **X-band EPR spectrometer based on MW bridge with 300 W solid-state amplifier and AWG unit**

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Technical advances of modern EPR spectrometers set up the frontiers of EPR-related methodologies and approaches. Considering EPR spectrometers of conventional microwave bands, such as X- and Q-, high-power amplifiers, arbitrary wave generators and fast digitizers are the essential units required for up-to-date pulse EPR techniques.

Herein we describe X-band EPR spectrometer constructed in the Magnetic Resonance Laboratory of Biomolecular Systems (NIOCH SB RAS) and featured all the required equipment to perform state-of-art pulse EPR experiments. Among the general construction of the spectrometer, the scheme of the microwave bridge is considered in details including pulse-forming and pulse-monitoring unit, and low-noise amplifier with pulse protection circuit. A modular open source software “Atomize” (<https://github.com/Anatoly1010/Atomize>) is used to control the spectrometer including AWG and fast digitizer cards featured high-speed data streaming. Wideband dielectric EPR resonator was developed to fit the requirements for AWG experiments with chirp pulses. The spectrometer is designed to have high dynamic range, low coherent noise and to capture the direct dimension efficiently. These capabilities were demonstrated with both rectangular and AWG pulse experiments.

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