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An improved coupling design for high-frequency TE011 electron paramagnetic resonance cavities

Savitsky A., Grishin Y., Rakhmatullin R., Reijerse E., Lubitz W.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

In high-frequency electron paramagnetic resonance (EPR) spectroscopy the sample is usually accommodated in a single-mode cylindrical TE011 microwave cavity. This cavity stands out in terms of flexibility for various types of EPR experiments due to convenient control of its resonance frequency and easy waveguide-to-cavity microwave coupling. In continuous wave and in pulsed EPR it is, however, essential to be able to vary the coupling efficiency over a large range. We present a new mechanical design to vary the microwave coupling to the cavity using a movable metal sphere. This coupling sphere is shifted in the plane of the iris wall inside the coupling waveguide. The design allows for a compact and robust construction of the EPR probehead that can be easily accommodated inside a limited space of helium flow cryostat. The construction details and characterization of the coupling element for 95 GHz (W-band) EPR as well as for 34 GHz (Q-band) are presented. © 2013 American Institute of Physics.

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