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### Reference

to the thesis «Investigation of electron-wave interactions in aim of design of high-stability THz gyrotrons with a moderate output power» presented by Anton Sergeevich Sedov for disputation to the title: Candidate of Phys.-Math. Sciences (speciality 01.04.03 «Radiophysics»)

The presented thesis shows real state of existing submillimeter wave sources most of them can barely meet high resolution spectroscopy applications like EPR and DNP in the range of 180 - 260 GHz. The designed under this dissertation and fabricated in the IAP RAS new 258 GHz gyrotron was the first available source offering in the beginning up to 50 Watt in CW to the liquid-state DNP spectrometer had opened unique opportunity to study Overhauser effect in aqueous and organic solutions of different free radicals at the Goethe University, Frankfurt. Operation frequency of 258 GHz of the new-made gyrotron was amazingly near to the value mentioned in the order specification demonstrating skilled calculation capabilities of the design approach. Since 2009 the gyrotron shows high stability of the operation frequency ( $4 \times 10^{-6}$ ) with a capability to tune it in the 65 MHz range that is important feature in the case of radicals having narrow EPR lines. Output power stability ( $10^{-2}$ ) is good enough to meet all experimental specifications during DNP and EPR measurements in the lab. An additional advantage of this gyrotron is the ability to work in the other modes with different frequencies in a particular frequency of 264 GHz, and is currently used in the experiments.

The gyrotron has been proved to be a robust device that is important feature taking into account that most of users are not skilled postgraduate students at the University.

The gyrotron design is compatible with conditions in the lab meeting German safety rules. Output waveguide interface of the gyrotron together with the mode converter which is adopted to the european standards, allowed to connect it easily to microwave and RF test equipment of leading manufacturers.

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