# Supporting Information: Control and Manipulation of Microwave Polarization and Power of a frequency-agile 198 GHz Gyrotron for Magnetic Resonance

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Qualitative analysis of the microwave beam profile
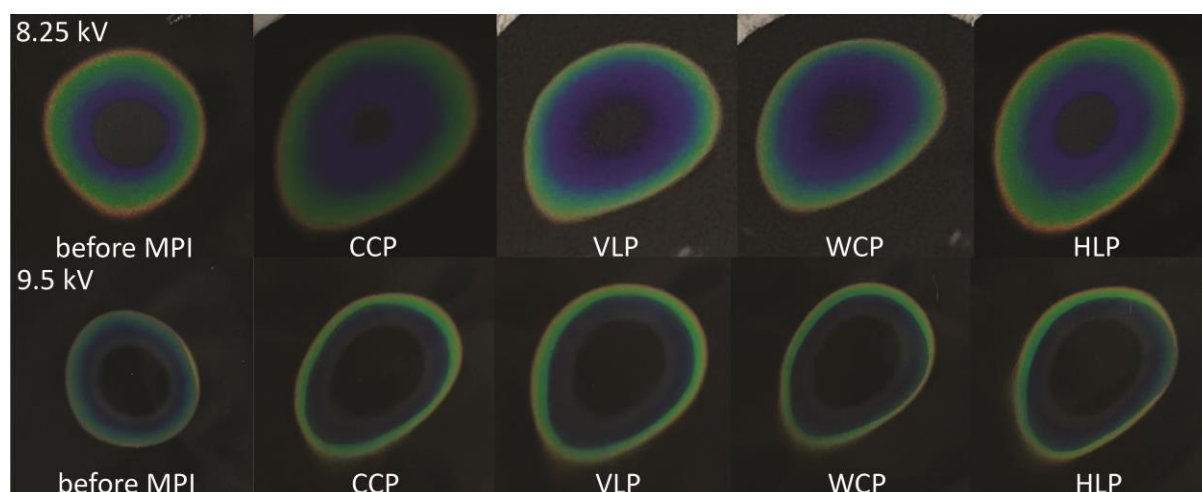
Figure S1: Beam profiles measured with temperature sensitive liquid crystal sheets from Edmund Optics. The first row corresponds to the measurements performed at a gyrotron voltage of 8.25 kV while the second row profiles were recorded at a voltage of 9.5 kV. The 1st column depicts the beam profiles before the microwaves enter the quasi optical system, while the 2nd to 5th columns correspond to the different polarizations (CCP: correct handed circular polarization, VLP: vertical linear polarization, WCP: wrong handed circular polarization, HLP: horizontal linear polarization). The microwave beam profiles before the Martin-Puplett interferometer (MPI) fit the Gaussian beam well. For the operating point of 8.25 kV a liquid crystal sheet with a temperature range of 30 °C – 35 °C (red 30 °C – green 31 °C – blue 35 °C) was used while for 9.5 kV the liquid crystal sheet had a temperature range of 40 °C – 45 °C (red 40 °C – green 41 °C – blue 45 °C). The black regions in the middle of the beam profiles indicate that the heating caused by the microwaves is outside the temperature range of the sheets.

Comparison between theoretically calculated and measured power at the end of the quasi optical system
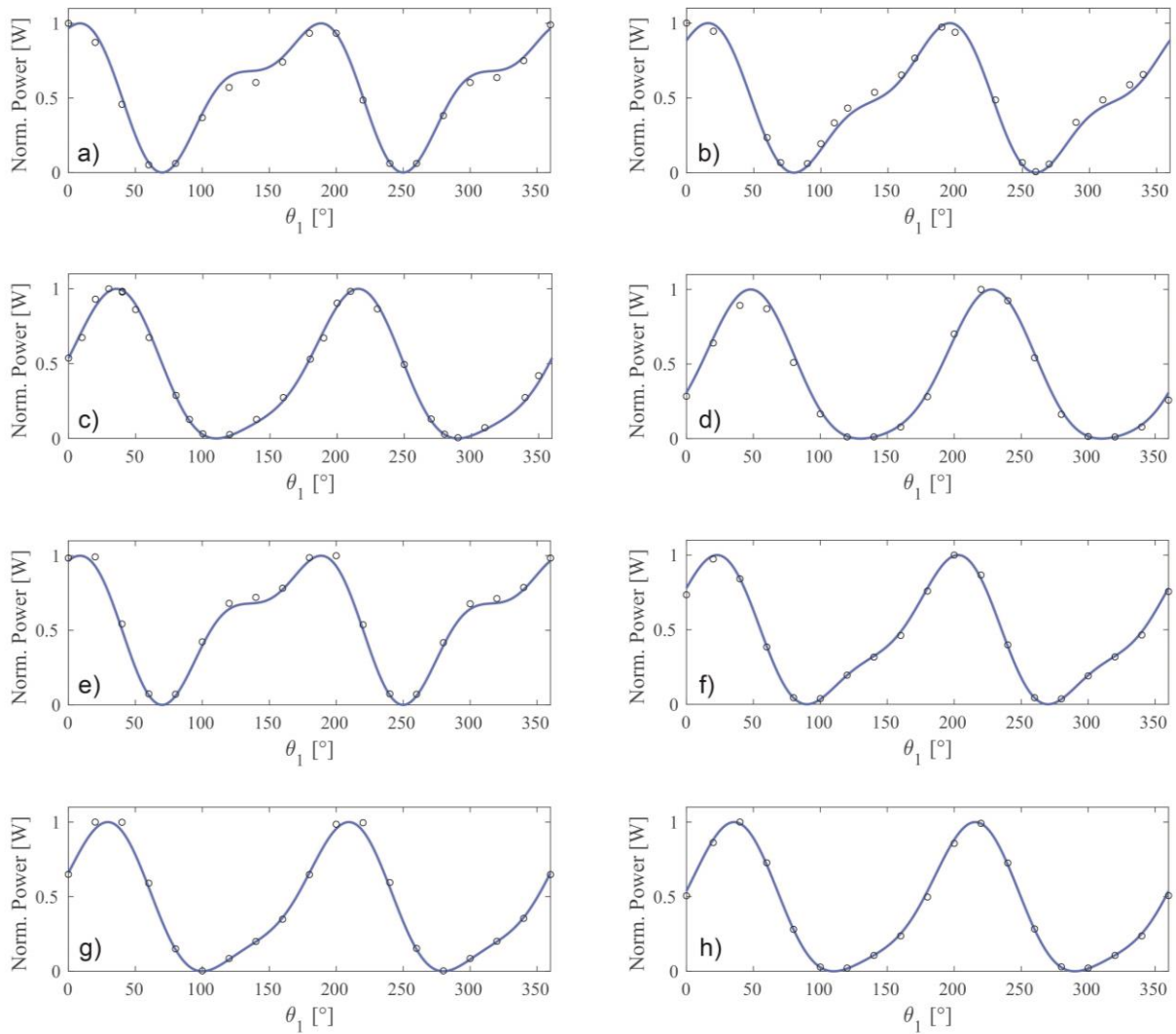
Figure S2: Measured power as a function of the angle θ_1 of RWGP1 for a fixed RWGP2 (a) $\theta_2 = 70°$, b) $\theta_2 = 80°$, c) $\theta_2 = 110°$ and d) $\theta_2 = 130°$, e) $\theta_2 = 70°$, f) $\theta_2 = 90°$, g) $\theta_2 = 100°$, h) $\theta_2 = 110°$) is displayed with black circles. The blue curves correspond to the theoretically calculated power using the parameters for which the global error is minimum. a)-d) were recorded with the gyrotron being operated at 8.25 kV and e)-h) correspond to the measurements performed at an accelerating voltage of 9.5 kV.