Design and development of a X-band EPR cavity with microwave magnetic field leakage for measurements of intact mobile phone touch screens

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The aim of this work was to design and to build an EPR cavity, compatible with the X-band commercial spectrometers, and with a non radiating slit such that the sample to be measured may be lodged outside the cavity, without being disassembled or altered in any way. In particular, the set up will be adapted to the measurement of radiation induced radicals in the glass of mobile phone displays.
The starting point was a cylindrical cavity, characterized by high unloaded quality factor, Q_u, designed to work with modes such that on one region of the cavity, along the side wall, the magnetic and the electric fields have their maximum and minimum value, respectively (Fig. 1). The slit was realized on this side wall, in order to allow for microwave magnetic field leakage. Different geometrical configurations were simulated. Simulations were performed using the software Microwave Studio (CST) for the 10 GHz field and EM Studio (CST) for the 100 kHz modulation field.
In this work, the criteria used to choose the resonant modes and the sizing of the cavity structures, the results obtained from the simulations, as well as preliminary results of the experimental measurements achieved with the cavities prototypes will be shown.

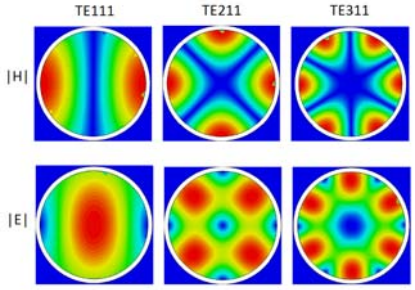

Fig. 1 – Magnetic (H) and electric (E) field distribution for several modes in the cross section of a cylindrical waveguide resonator.