

A CHIRP PULSE FOURIER TRANSFORM MICROWAVE SPECTROMETER WITH MULTI-ANTENNA DETECTION (MAD-CP-FTMW)

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At the 74th ISMS, our group showed that it is possible to detect microwave radiation in a CP-FTMW experiment that did not copropagate in the direction of incident radiation. In that talk, it was shown that this could be achieved with the broadcast antenna by the implementation of a circulator, switch, and low noise amplifier in order to also detect off of the same antenna. Coincidentally, the circulator that was utilized attenuated the input power below a level where this detection would be advantageous to the overall signal-to-noise ratio (SNR) of the collected free induction decays (FIDs). However, this discovery provided both the preliminary data and the impetus for a new hypothesis to be tested: Could FIDs be detected at other points not in the direct linear path of the incident microwaves? To address this, we utilized our new microwave three-wave mixing (M3WM) instrument based upon the four-antennae design of Pate in order to utilize the orthogonality of the setup for the purposes of CP-FTMW FID collection. The design of the new four-antennae MAD-CP-FTMW at Missouri S&T will be presented along with the exciting results of detection in traditional, 180 degree, and quadrature angles. Additional testing, done to mitigate the concern of reflection voiced in the original presentation, will also be discussed. Additional information concerning this spectrometer's design and functionality, as well as further details related to data processing, will be discussed in presentations given by Nicole Moon, and Christian Swanson, respectively.