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NEMA tests on a whole-body TOF PET/MR scanner with and without simultaneous MR pulse sequences

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In this work we present the characterization of the physical performance of the fully integrated PET/MR whole body system SIGNA PET/MRI (GE Medical Systems), following the NEMA NU 2-2012 standards. All the measurements, except count rate performance, have been performed first in the PET-only mode, without the simultaneous MR acquisition (MR-idle), then with two different MR pulse sequences on (MR-pulsing). According to the N-02 standards, the characterization of the SIGNA PET/MRI scanner yielded the following results: 1) transverse (axial) spatial resolution (FWHM) (1cm and 10cm off axis): 4,35(5,67)mm and 5.05(7,29)mm 2) sensitivity (average at 0cm and 10cm): 22,31cps/kBq; 3) scatter fraction: 42,16; 4) NEC peak rate: 225 kcps at 16,2kBq/cc using k=1 in the NEC formula for random coincidences estimation. 5) The residual error from attenuation and scatter corrections was 1.9%. The average energy resolution was 10,3%, the time resolution was 375ps. No effect of MR pulse sequences on PET measurements was observed. In conclusion, the SIGNA PET/MRI system shows very good performance.

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