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First results from the wide angle spin echo spectrometer WASP

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The first neutron spin echo (NSE) instrument IN11 was in user operation for 40 years at ILL. The newest spin echo instrument WASP took the relay and just had its first full year of user operation. We will use this occasion to review how the design of the wide angle NSE spectrometers has developed over the years. Apart from WASP, most functioning NSE spectrometers use the basic IN11A design where the precession field is generated by long solenoids along the neutron beam. This construction dramatically limits the angular detector coverage and count rate of the instruments. Last century there have been two attempts to make a wide-angle coverage neutron spin echo instrument: IN11C at ILL was equipped with a flattened solenoid downstream of the sample and was in use until recently. It had a 30 degree-wide angular coverage at the cost of reduced resolution. This instrument was practically trading intensity for resolution. The SPAN instrument [1] at HZB used a pair of coils in the anti-Helmholtz configuration creating an azimuthally symmetric magnetic field, which, in theory, could allow a nearly 360 deg. detector coverage. WASP uses an improved SPAN construction, and it provides a 500 times higher detected intensity than IN11A, while the resolution remains the same.

The long construction has finished in 2018, and the instrument has seen 4 full cycles of user operation. We will present the characteristics of the spectrometer and the first published scientific results on collective dynamics of glass formers [2] and the dynamics of confined ionic liquids [3].

References

[1] C Pappas et al., Physica B: Condensed Matter, 283, 365-371 (2000).

[2] P Luo et al. Nature Communications, 13, 2092 (2022)

[3] H Frielinghaus et al., Frontiers in Physics, 10, 872616 (2022)

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