ECPD 2021
European Conference on Plasma Diagnostics

Design of the cross-polarization scattering diagnostic on HL-2A

R.H. Tong[1], W.L. Zhong[1], Z.B. Shi[1], X.L. Zou[2], Z.C. Yang[1], J. Wen[1] and HL-2A team[1]

1) Southwestern Institute of Physics, P.O. Box 432, Chengdu 610041, People's Republic of China

E-mail : tongruihai@gmail.com

2) CEA, IRFM, 13108 Saint-Paul-lez-Durance, France

Abstract：The design and performance of a new cross-polarization scattering(CPS) diagnostic is presented，which is based on the scattering of an incident microwave beam into the opposite polarization by magnetic fluctuations[1, 2]. Through design and platform testing, the CPS diagnostic has the following characteristics: 8 frequency points in Q band; the power flatness is less than 10 dB. The cross-polarization scattering signal is detected by two methods: dual-polarized horn and polarizer. Laboratory test results show that both methods have a rejection ⩾30dB，typical results shown in figure 1. Through the optimization of the quasi-optical system, the launch angle can be adjusted within ±10°, and the microwave beam waist radius is about 80 mm (at 700 mm). The 3-D ray tracing code: GENRAY is used to simulate the propagation of the probe and scattered rays. In the future, the CPS diagnosis will be used to study the electromagnetic fluctuation behavior of the high-performance plasma and strong gradient region of the HL-2A/2M tokamak.

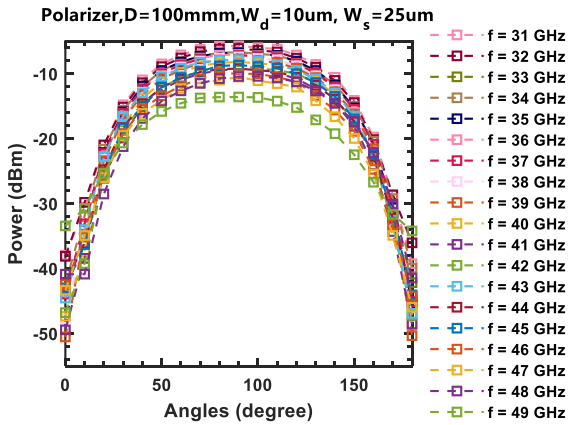

Figure 1. The measured power with different polarizer angles

References

1. Zou XL, *et al.* Internal Magnetic Turbulence Measurement in Plasma by Cross Polarization Scattering. Physical Review Letters 1995, 75(6): 1090-1093.
2. Barada K, *et al.* Measurement of local, internal magnetic fluctuations via cross-polarization scattering in the DIII-D tokamak (invited). **Review of Scientific Instruments 2016**, 87(11)**:** 11E601.