Comment on "On the spatial and temporal resolution of ion temperature measurements based on neutral beam scattering"

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(Received 10 March 1987; accepted for publication 18 March 1987)

The discrepancies found by Donné and Barbian [A. J. H. Donné and E. P. Barbian, Rev. Sci. Instrum. **58**, 1320 (1987)] can be attributed principally to the choice of experimental and technical limits, basic assumptions, and definitions.

Independently performed calculations are the basis of our publication on the design of an ion-temperature diagnostic for STOR-M (hereafter called Ref. 1). We clearly notice the different results found by Donné and Barbian described in their letter (Ref. 2). In our view, these discrepancies can be attributed principally to the choice of experimental and technical limits, basic assumptions, and definitions.

To demonstrate the importance of these choices, we describe a few details distinguishing our concept from the approach in Ref. 2.

Since the total of additional broadening $\Sigma\sigma_i^2$, including the effect of angular spread, can be determined separately in our setup, its contribution to s^2 does not necessarily enter as a part of $\Delta T_i/T_i$.[1] In Ref. 1, for example, the relative corrections on s^2 are $\sigma_E^2/\sigma^2 = 0.01$ and $\sigma_0^2/\sigma^2 = 0.10$. The total number of 200 counts per spectrum, therefore, is not affected and remains an acceptable goal to achieve 10% accuracy.

Our design value for the time resolution is based on this number and on the high counting performance achievable in the scheme of MCP and adjacent local electronics.

This, basically, is not compatible with a TOF analyzer using a single-output, small-area MCP.

With respect to the spatial resolution, one should distinguish the directions parallel and perpendicular to the length l of the scattering volume. For STOR-M the perpendicular direction is chosen to be radial in the torus midplane.[1] The respective relevant spatial resolution is equal to the beam diameter of 1 cm. For the other direction (poloidal in STOR-M) one can use $\delta x = 1/3\, l$ (2.2 cm), since the underlying assumption is not too unrealistic along a line piece l tangential to the equilibrium fluxsurface.

We consider the discussed scattering experiment as a very promising diagnostic tool. It is anticipated that the large amount of valuable data attainable justifies the effort needed to fully exploit this experiment.

[1] E. J. M. van Heesch, A. Hirose, A. Sarkissian, and H. M. Skarsgard, Rev. Sci. Instrum. **57**, 1792 (1986).
[2] A. J. H. Donné and E. P. Barbian, Rev. Sci. Instrum. **58**, 1320 (1987).

 0034-6748/87/071322-01$01.30