

# Data assessment on cross section data for $^{10}\text{B}(p,p)^{10}\text{B}$ backscattering up to 5 MeV

S. Tietz and M. Mayer

Max-Planck-Institut für Plasmaphysik, Boltzmannstr. 2, 85748 Garching, Germany

In this report the available data for proton backscattering from 10-boron will be discussed. Additional data not yet included in IBANDL have been taken from EXFOR and have been submitted to IBANDL.

The largest measurement series was performed by M. Chiari et al. [6], who already compared their data with most previous data. The experimental data of A.B. Brown et al. [1] were not taken into account by Chiari and will be taken in special consideration. A complete list of data can be found at the end in table 1.

Figure 1 compares experimental data of M. Chiari et al. [6] with data of J.C. Overley and W. Whaling [2] at an angle of  $120^\circ$ . The same is done for an angle of  $155^\circ$  in Figure 2. In both cases the data by Overley/Whaling are about 20% higher than the one by Chiari, which points to a systematic error.

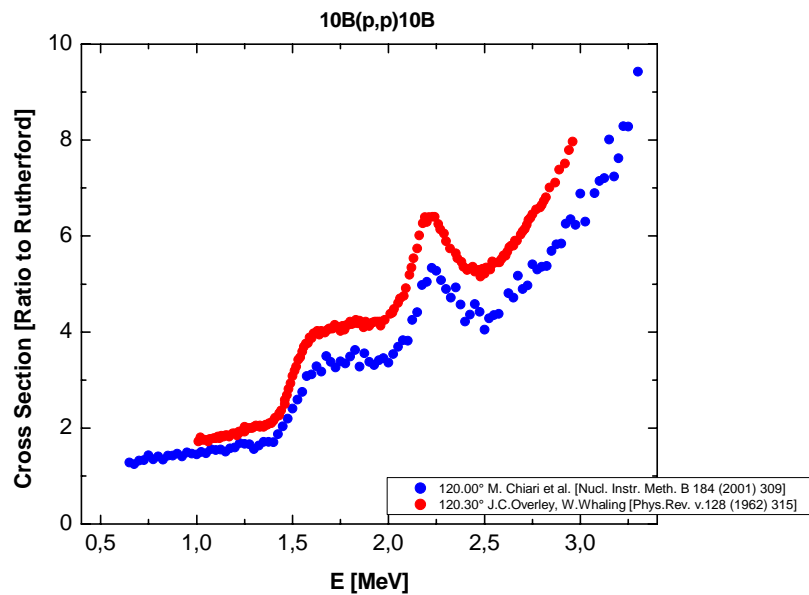


Fig. 1: Comparison of different experimental data for  $120^\circ$ .

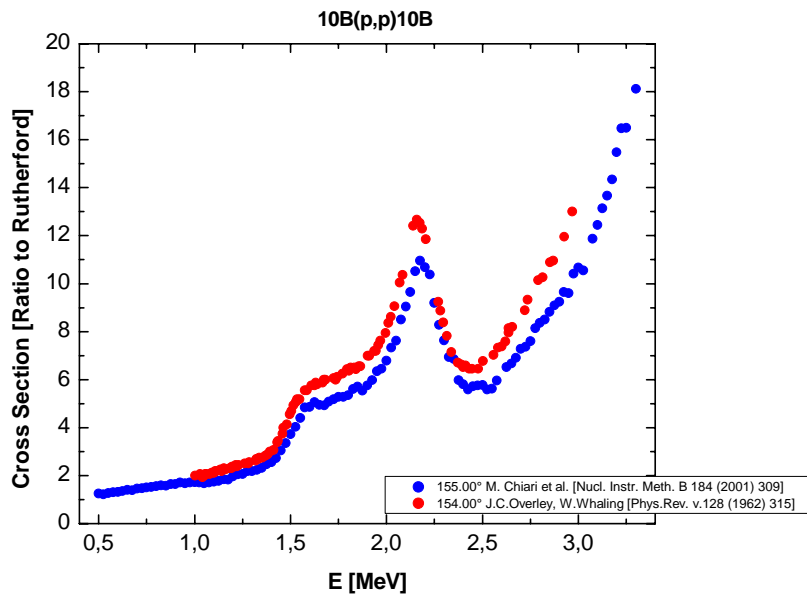


Fig. 2: Comparison of different experimental data for 155°.

In Figure 3 the data of M. Chiari et al. [6] and A.B. Brown et al. [1] in the angular range from 135° to 140° are compared. For energies up to 1.7 MeV both measurements of Chiari are very close together, while the data of Brown are up to 10% lower. In the energy range from 1.5 to 1.7 MeV the data sets are almost consistent.

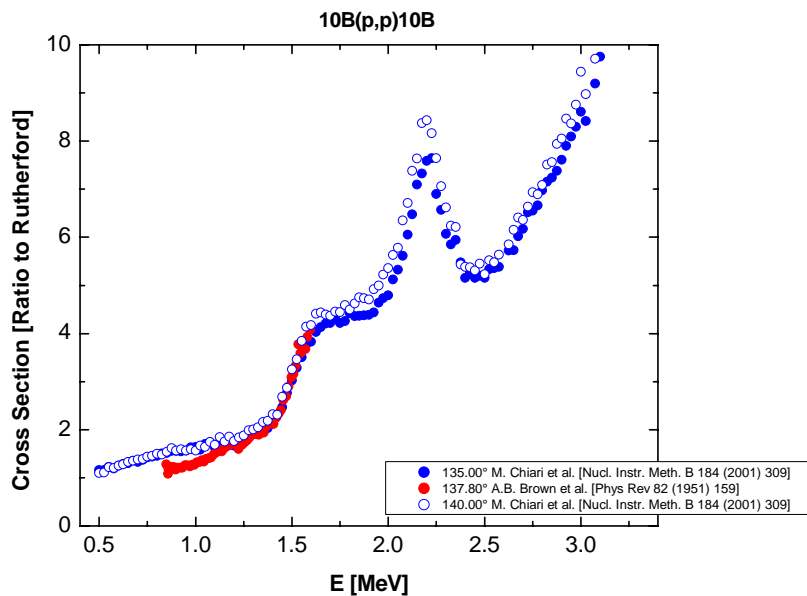


Fig.3: Comparison of different experimental data for 135°-140°.

The oldest measurements (done before 1960), i.e. A.B. Brown et al. [1], are 10% lower than the one by M. Chiari et al. [6]. This was already observed for the  $^{11}\text{B}(p,p)^{11}\text{B}$  data [7] and might be a systematic error as a result of the inferiority of the vacuum in the 1950's and 1960's. In contrast the data obtained by J.C. Overley and Whaling [2] are 15% higher than the Chiari data.

To clarify the contradiction between Chiari and Overley/Whaling further experiment are necessary. In the meantime Chiari's results might be a good choice for cross section data for the  $^{10}\text{B}(p,p)^{10}\text{B}$  backscattering. The stated error is 5%. The data were provided in numeric form to IBANDL, so that no

additional digitizing errors occurred. Drawback is the large statistical error, which may result in corrugated spectra.

Table 1: Publications containing  $^{10}\text{B}(p,p)^{10}\text{B}$  backscattering data.

Energy Range (MeV)	Angle in the Lab.(°)	Error	Data Presentation	Reference	IBANDL	EXFOR	Action
0.9-1.6	137.8	-	Graph	Brown [1]	Data missing	A1457002	Data converted from EXFOR to IBANDL
0.6-3.0	84.3	7%	Graph	Overley/Whaling [2]	data included	F0211002	
0.6-3.1	120.3	7%	Graph	Overley/Whaling [2]	data included	F0211002	
0.6-3.2	154	7%	Graph	Overley/Whaling [2]	data included	F0211002	
0.5 – 2.9	various		Graph	Overley/Whaling [2]	Angular distributions, data unsuitable for IBANDL	F0211003	
5.3-13.0	59.7	-	Graph	Watson [3]	data unsuitable due to high energy	F0156002	
5.3-13.0	85.65	-	Graph	Watson [3]	data unsuitable due to high energy	F0156002	
5.3-13.0	110.54	-	Graph	Watson [3]	data unsuitable due to high energy	F0156002	
5.3-13.0	129.7	-	Graph	Watson [3]	data unsuitable due to high energy	F0156002	
5.3-13.0	152.87	-	Graph	Watson [3]	data unsuitable due to high energy	F0156002	
5.0-16.5	65	-	Graph	Watson [4]	data unsuitable due to high energy	F016200	
5.0-16.5	85	-	Graph	Watson [4]	data unsuitable due to high energy	F016200	
5.0-16.5	90	-	Graph	Watson [4]	data unsuitable due to high energy	F016200	
5.0-16.5	115	-	Graph	Watson [4]	data unsuitable due to high energy	F016200	
5.0-16.5	135	-	Graph	Watson [4]	data unsuitable due to high energy	F016200	
5.0-16.5	155	-	Graph	Watson [4]	data unsuitable due to high energy	F016200	
5.4-7.5	150	-	Graph	Watson [4]	data unsuitable due to high energy	F016200	
0.5-3.3	100	5%	-*	Höhn [5]	data included		
0.5-3.3	105	5%	-*	Chiari [6]	data included	O0922002	
0.5-3.3	110	5%	Graph*	Chiari [6]	data included	O0922002	
0.5-3.3	115	5%	-*	Chiari [6]	data included	O0922002	
0.5-3.3	120	5%	-*	Chiari [6]	data included	O0922002	
0.5-3.3	125	5%	-*	Chiari [6]	data included	O0922002	
0.5-3.3	130	5%	-*	Chiari [6]	data included	O0922002	
0.5-3.3	135	5%	Graph*	Chiari [6]	data included	O0922002	
0.5-3.3	140	5%	-*	Chiari [6]	data included	O0922002	
0.5-3.3	145	5%	-*	Chiari [6]	data included	O0922002	
0.5-3.3	150	5%	Graph*	Chiari [6]	data included	O0922002	
0.5-3.3	155	5%	-*	Chiari [6]	data included	O0922002	
0.5-3.3	160	5%	-*	Chiari [6]	data included	O0922002	
0.5-3.3	165	5%	-*	Chiari [6]	data included	O0922002	
0.5-3.3	170	5%	Graph & Table*	Chiari [6]	data included	O0922002	

\* data provided in numeric form by M. Chiari

## References

- [1] A.B. Brown et al.: Phys. Rev. 82 (1951) 159
- [2] J.C. Overley and W. Whaling: Phys. Rev. 128 (1962) 315
- [3] B.A. Watson et al.: Phys. Rev. 182 (1969) 977
- [4] B.A. Watson et al.: Phys. Rev. 187 (1969) 1351
- [5] J. Höhn et al.: J. Phys. G: Nucl. Phys. 7 (1981) 803
- [6] M. Chiari et al.: Nucl. Instr. Meth. B184 (2001) 309
- [7] S. Tietz and M. Mayer, Data assessment on cross section data for  $^{11}\text{B}(p,p)^{11}\text{B}$  backscattering up to 5 MeV