**IV characteristics of the Ball Pen Probe**

A very good discharge, #23034, is analyzed - see the left panel. Raw probe data (rBPP =80 mm) are shown in the right panel. The probe voltahe is swept between ~-95 V and + 78 V.



We selected period between 18th and 20th ms, where main plasma parameters are almost constant, in the range of:

Ip = 5.6 kA, Bt = 0. 47 T, ne = 4.7 1018 m-3, Uloop = 3.45 V.

The selected time interval contains two IV characteristic at the ramp-up probe voltage and two IV characteristics with ramp-down voltage. Note, the capacitive pick-up current was not removed, so the raw data are plotted in the next figures.



We observe:

* A clear ion saturation current.
* An indication of saturation the electron current above Uprobe > 40-50 V.

Average IV characteristic during the ramp up and ramp down phase of the voltage sweeping are compared in the next figure.



A difference in the ion saturation currents is due to neglecting capacitive pick-ups.

Conclusions:

* Saturation of the electron and ion current is seen (as expected)
* The ion saturation is around 0.15 V, the electron saturation around 0.8 V. So, the ratio Iesat/Iionsat is in the range of 5.3. for Btor = 0.47 T.
* More detail analysis of IV characteristics must be performed for other time intervals and for more probe positions at this series of discharges.
* We did good job!

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