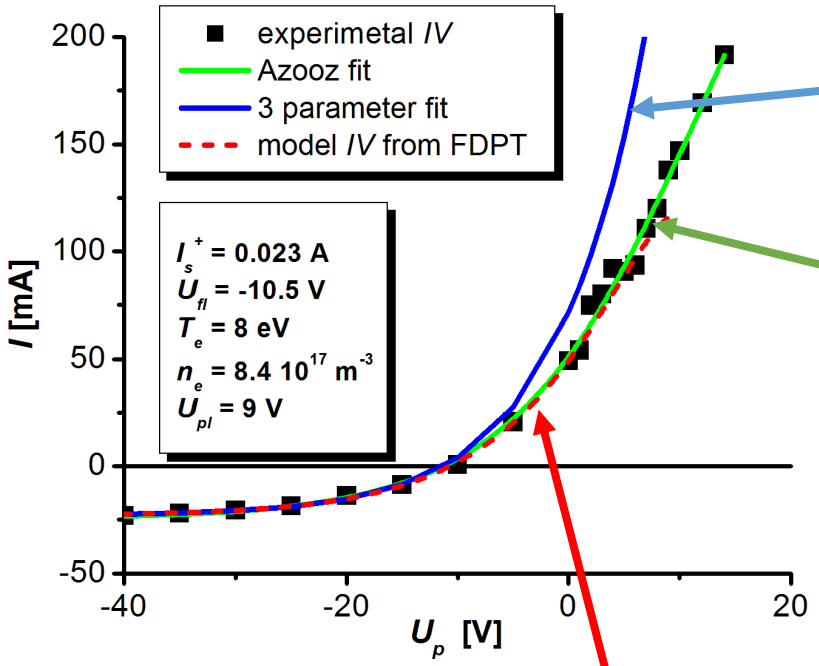
# Probe measurement in tokamak discharge - 2

Experimental IV characteristics are processed by three techniques:




1. Classical technique (3 parameters fit)

$I_p = I_{sat}$ (1-exp[($U_{fl}$ - $U_p$)/$T_e$]

The electron branch is not taken into account ($V_{probe} < V_{fl} + T_e$)

2. Empirical fit according empirical formula proposed by Azooz)

$I_p = \exp[a_1 * \tanh (U_p + a_2)=a_3] + a_4$

where $a_1$-$a_4$ are linked to plasma parameters

A. Azooz, *Four free parameter empirical parametrization of glow discharge Langmuir probe data*, Review of Sci. Instr. 79. 2008, 103501

3. First derivative technique according **(see talk of Tsv. Popov)**

$$I_e(U) = -\frac{2eS}{3\sqrt{2m_e}} \int_{eU}^{\infty} \frac{(\varepsilon - eU) f(\varepsilon) d\varepsilon}{\gamma(\varepsilon)\left[1 + \frac{(\varepsilon - eU)}{\varepsilon}\psi(\varepsilon, B)\right]}$$

$$f(\varepsilon) = \frac{3\gamma\sqrt{2m}}{2e^3 S} \cdot \frac{\psi(\varepsilon, B)}{U} \cdot \frac{dI_e(U)}{dU}$$

Tsv. K. Popov et al, *Electron energy distribution function, plasma potential and electron density measured by Langmuir probe in tokamak edge plasma* Plasma Phys. Control. Fusion, 51 (2009)