front of the probe is lowered on the electron side and is strengthened on the ion side. This effect causes higher values of the ion impact energy on the ion side and lower values on the electron side. As can be seen from Tab. 1 the difference may be some tens of eV in the boundary layer, which may be an indication that the length of the collecting flux tube corresponds to several turns around the torus.

The asymmetric disturbance of the sheath potential by the toroidal electrical field was also used to explain the favoured arc ignition on the ion side of limiters [4].

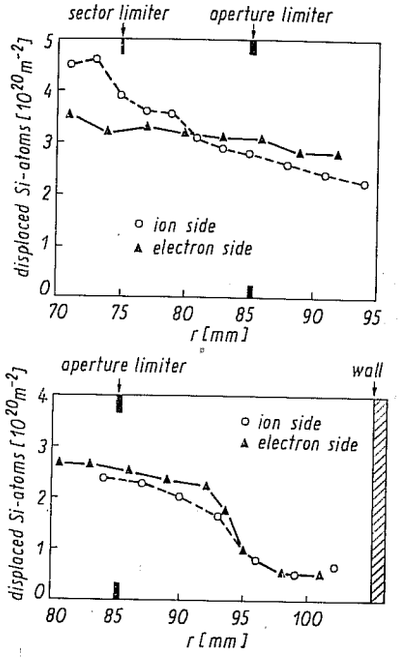

Fig. 4. Amount of damage in Si ⟨1, 1, 1⟩ induced by the plasma in co- and counter-direction of the plasma current in dependence on the minor radius
a in the boundary layer at a plasma current of 13 kA
b in the scrape-off layer at a plasma current of 10 kA

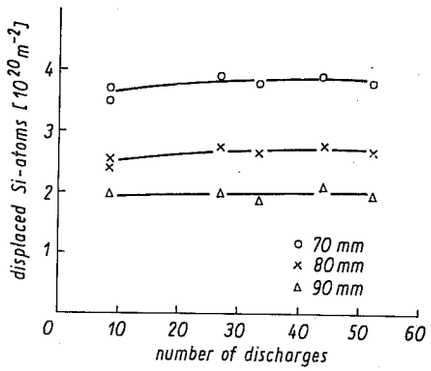

Fig. 5. Dependence of the damage amount induced by the plasma on the number of discharges with a plasma current of 10 kA

Table 1
Proton impact energies and derived values of the electron temperature at different minor radii

$I_p = 13$ kA			$I_p = 10$ kA	
r/mm	*IS*	*ES*	*IS*	*ES*
ion impact energy/eV				
70	150	110	120	90
80	100	90	80	90
90	70	80	60	70
electron temperature/eV				
70	30		25	
80	25		20	
90	20		15	

The electron temperatures in Tab. 1 were derived by averaging the values of the ion impact energy of both probe sides at a given minor radius.

The results of the collector probe investigations can be compared with data obtained by the Langmuir probe measurements. In Fig. 6 values of the plasma density and the electron temperature derived from the Langmuir probe characteristics are shown in dependence on the minor radius at different times during the discharge. The integration of the plasma flux over the discharge yields a total fluence of about 4×10^{20} protons/m². discharge at minor radii smaller than 85 mm. This fluence explains the damage saturation in Fig. 5. The T_e-values derived from both methods, collector and Langmuir probe measurements, agree satisfactorily. Even the plasma decay was found equal at similar minor radii (compare Fig. 4b and Fig. 6).

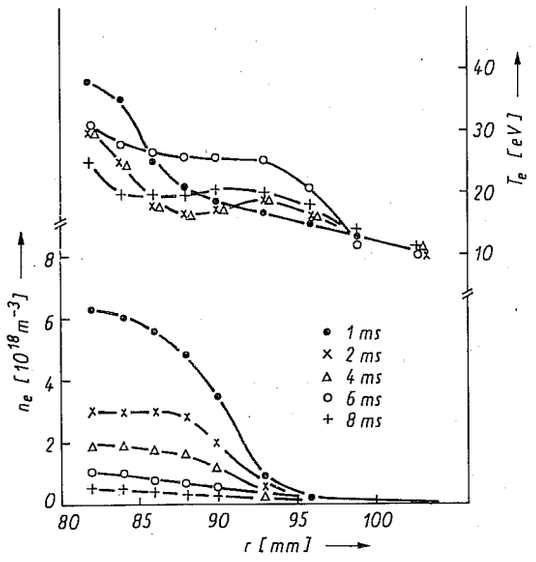

Fig. 6. Dependence of plasma density and electron temperature on the minor radius during different stages of the discharge obtained using the Langmuir probe at a plasma current of 12 kA