

Measurement of KSRS lifetime by the decay rate plot method

V.Ushkov

The decay rate can be written as

$$-\frac{dI}{dt} = a \cdot I^2 + b \cdot I^2 + c \cdot I$$

$a \cdot I^2$ - is assumed to be due to the Touschek effect,

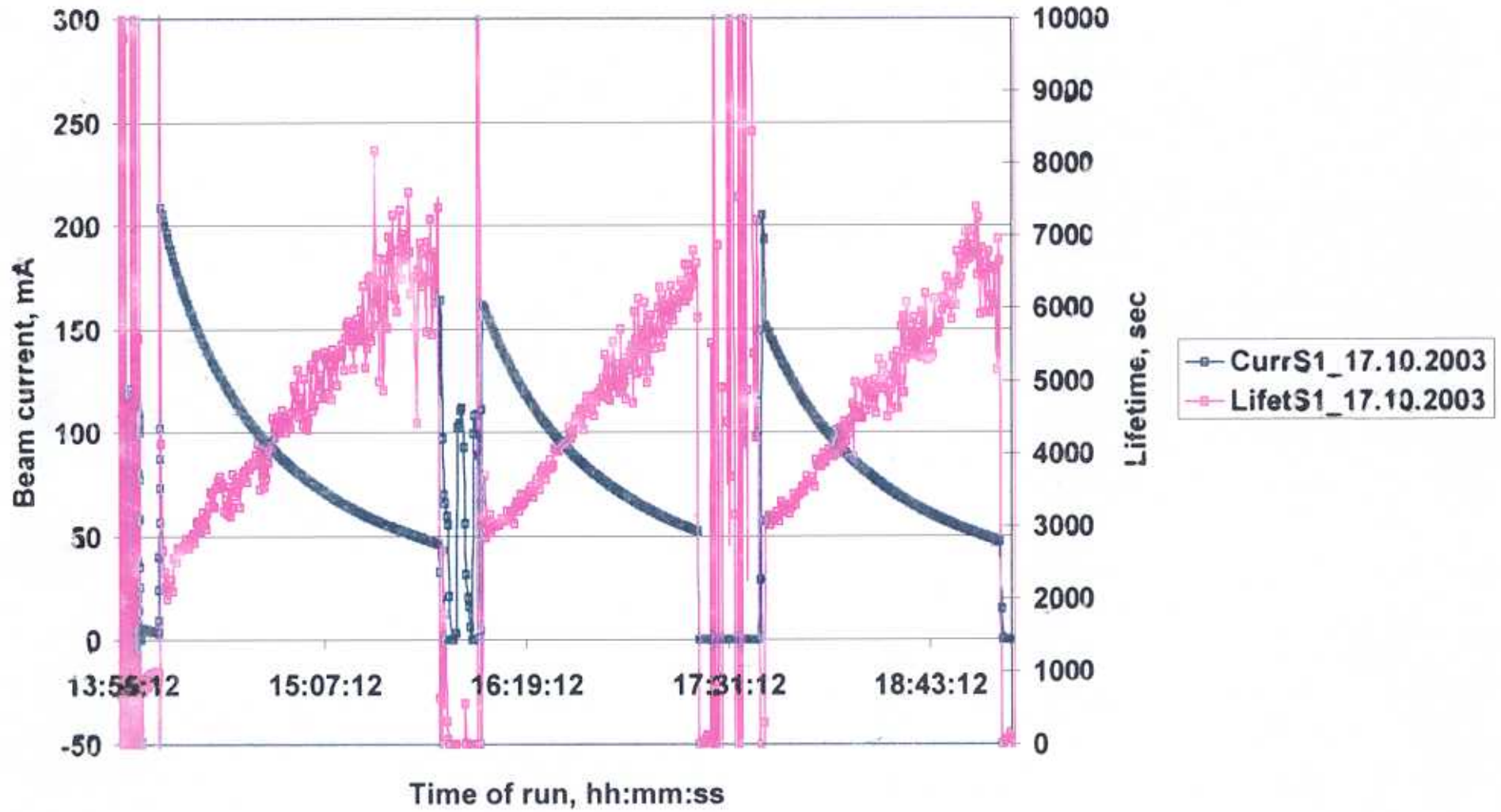
$b \cdot I^2$ - is due to the current dependent pressure induced by the gas desorption being proportional to I ,

$c \cdot I$ - due to the residual gas pressure

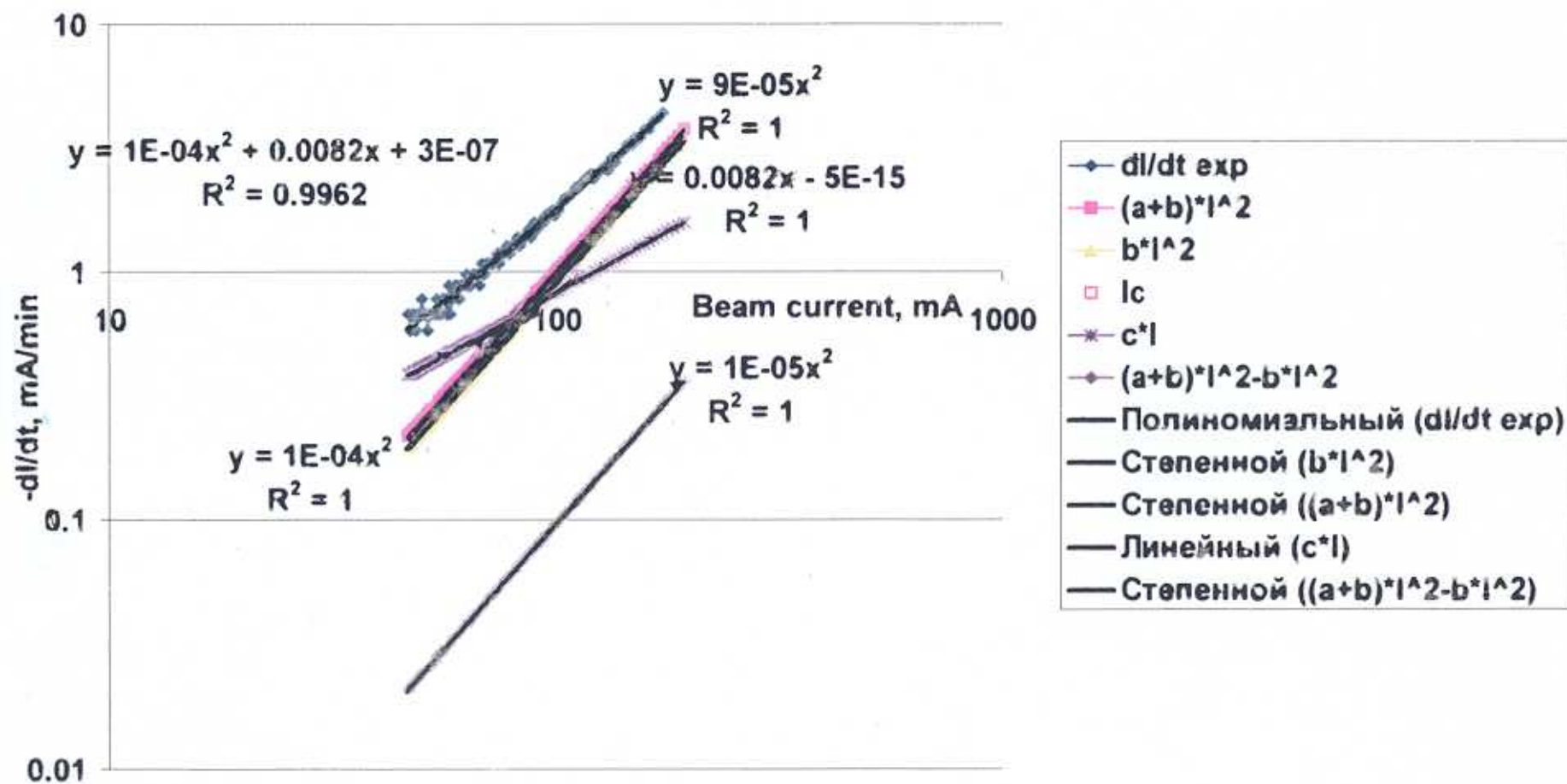
It should be noted that the lines of $b \cdot I^2$ and $c \cdot I$ intersect at beam current I_c at which the lines of $\langle P \rangle - P_0$ and P_0 also intersect. It finds value $c \cdot I_c$ which appears intersect point for the curve of $b \cdot I^2$.

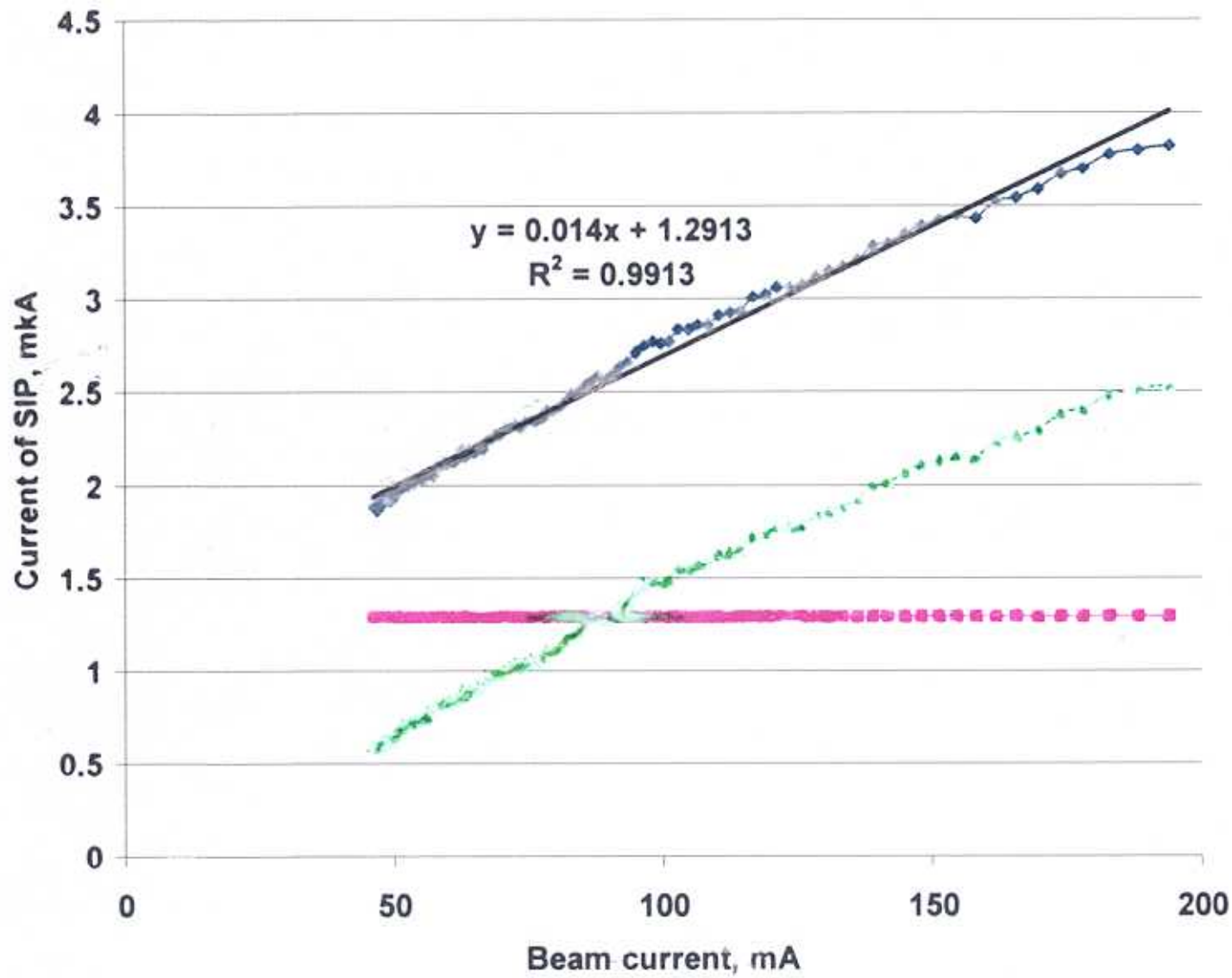
Difference $(a + b) \cdot I^2$ and $b \cdot I^2$ gives us value of the Touschek effect.

Beam current and lifetime



Decay-rate plot and components due to gas desorption, residual gas and the Touschek effect





- $\langle P \rangle = f(I)$
- P_0
- $\langle P \rangle - P_0$
- Линейный ($\langle P \rangle = f(I)$)

Lifetime of components and total lifetime

