



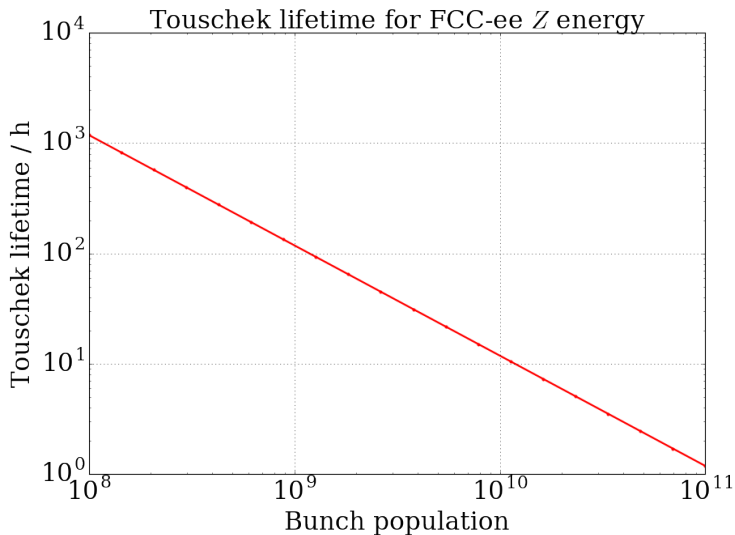
Touschek lifetime at Z

T. Tydecks

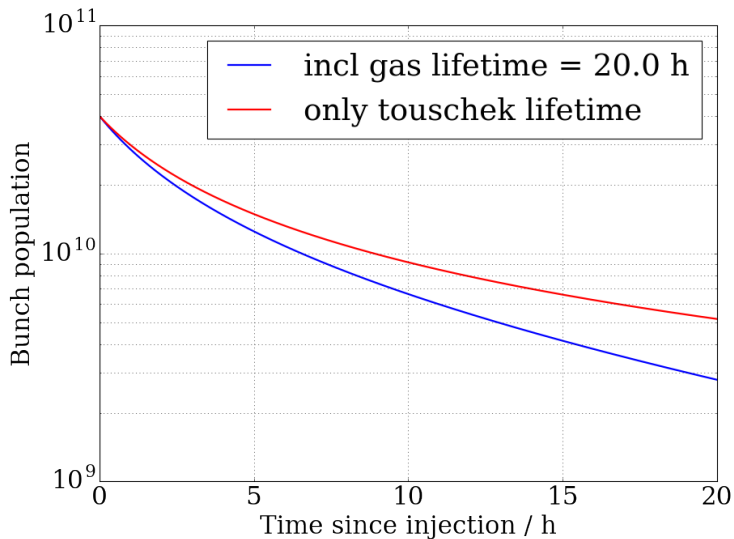
EPOL Workshop,
CERN

October 23, 2017

Touschek lifetime for Z pilot



Pilot Bunch Intensity VS Time



This is given by

$$\frac{1}{\tau_t(P)} = \frac{1}{\tau_t(0)} + \left\langle R(\epsilon) \frac{1}{\tau_t(0)} \right\rangle P^2, \quad (1)$$

with

$$R(\epsilon) = \frac{F(\epsilon)}{C(\epsilon)}, \quad (2)$$

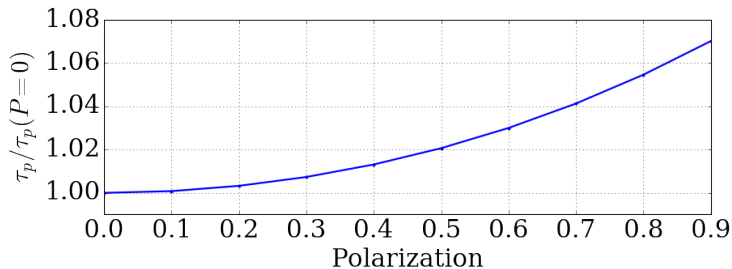
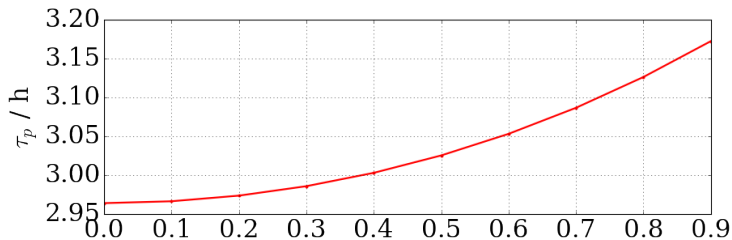
$$F(\epsilon) = -\frac{\epsilon}{2} \int_{\epsilon}^{\infty} \frac{1}{u^2} \ln \frac{u}{\epsilon} e^{-u} du, \quad (3)$$

$$C(\epsilon) = \epsilon \int_{\epsilon}^{\infty} \frac{1}{u^2} \left(\left(\frac{u}{\epsilon} \right) - \frac{1}{2} \ln \left(\frac{u}{\epsilon} \right) - 1 \right) e^{-u} du, \quad (4)$$

and

$$\epsilon = \left(\frac{\delta_{acc}}{\gamma \sigma_{x'}} \right)^2. \quad (5)$$

Touschek lifetime as a function of polarization



- ▶ Touschek lifetime estimated based on parameters given in table
- momentum acceptance dominated by dynamic aperture
 - ▶ polarization will have a 2 % effect on Touschek lifetime component for 50 % polarization
- ⇒ lifetime can be used as an indicator for depolarization IF single bunch lifetime measurement can be accurate enough

Thanks for your attention...



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