Réunion ThomX - 14 avril 2025

- **Damping time**

Damping time at ThomX

Damping time $\tau \sim \dfrac{T \,.\, E_e}{U_0}$

T	Period of the collision
U_0	Energy loss per turn
E_e	Electron energy

$$\frac{1}{\tau} \sim \frac{1}{\tau_{SR}} + \frac{1}{\tau_C}$$

❑ **SR** $\quad U_0(\text{joule}) = \dfrac{q^2}{6\,\pi\,\varepsilon_0}\,\gamma^4 N_d \dfrac{L_d}{\rho^2}$ $\qquad$ $U_0(\text{eV}) \sim 9.6\ 10^{-10}\,\gamma^4 N_d \dfrac{L_d}{\rho^2}$

N_d	Nb of dipoles
ρ	Bending radius dipole
L_d	Path length in a dipole

ThomX 50 MeV → $U_0 \sim 1.8$ eV $\qquad$ $\tau_{SR} \sim 1.7$ sec

❑ **Compton** $\quad U_0 = \dfrac{\text{Flux} \;.\, T \,.\, < E_X >}{N_e}$

Flux	at t=0
T	Period of collision
N_e	Nb e- per bunch

ThomX nomin.	50 MeV	1 nC ($6.2\ 10^9$ e-)	$2.6\ 10^{13}$ ph/s	$U_0 \sim 5.6$ eV	$\tau_C \sim 0.5$ sec
ThomX today	50 MeV	80 pC ($5.\ 10^8$ e-)	$2.0\ 10^{10}$ ph/s	$U_0 \sim 0.054$ eV	$\tau_C \sim 55$ sec

❑ **Total** $\quad \dfrac{1}{\tau} \sim \dfrac{1}{\tau_{SR}} + \dfrac{1}{\tau_C}$