Count Rate - simulation

Derenzo omog. Filled ($\Delta t = 1s$).

- The sorter behaves as a **non-paralyzable component**

\[
R_t \sim p_0^*A \\
\Rightarrow \quad R_o \sim \frac{p_0^*A}{1 + \tau^*p_0^*A}
\]

- Parameters:
  - $p_0 = 6.298 \pm 0.01872$
  - $\tau = 0.0001393 \pm 1.05e-07$
Real data vs simulation

**Experimental Count Rate - AAA setup**

- $p_0 = 6.298 \pm 0.01872$
- $\tau = 0.0001393 \pm 1.05e-07$
The **experimental data** shows that the \( wc \) slightly increase as a function of the activity.

The **simulation** shows that the \( wc \) don't increase as a function of the activity \( <wc> = 8.4 \)
The difference don't explain the count losses in the experimental curve

\[ R_0 \sim \frac{p_0 \cdot A}{1 + \tau A} \quad p_0 = 6.329 \text{ (fit)} \]
Hybrid model: J.A. Soreson – Deadtime characteristic of anger cameras; The Journal of Nuclear Medicine Vol. 16 No. 4 284-288

- Paralyzable \((\text{front-end electronics})\)
  \[ R' = R_t e^{-R_t \tau_p} \]

- Non-paralyzable \((\text{DAQ})\)
  \[ R_o \approx \frac{R'}{1 + R' (\tau_n - \tau_p)} \]

- Hybrid model
  \[ R_o \approx R_t / \{e^{R_t \tau_p} + (k - 1)R_t \tau_p\} \]

\[ \tau_n \geq \tau_p, \quad k = (\tau_n / \tau_p) \]
Fit with the hybrid model – AAA setup

\[ \tau_{np} = 117 \text{ us} \quad \tau_p = 54 \text{ us} \]
... hypotesis

- There is a paralysable component (where?)

- There isn't any paralyzable component:
  - The behaviour of the deadtime as a function of the $wc$ isn't linear (it grows rapidly)
    - $\Rightarrow$ New model