



Istituto Nazionale di Fisica Nucleare

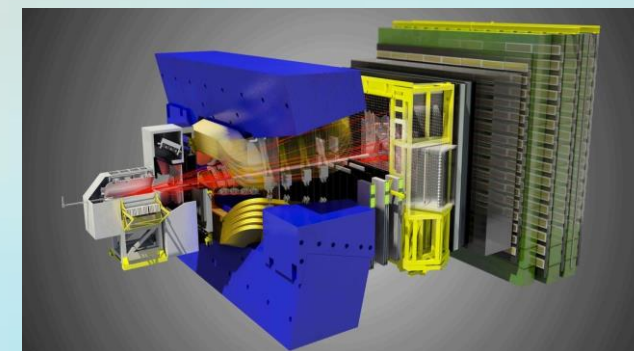


Your measurements

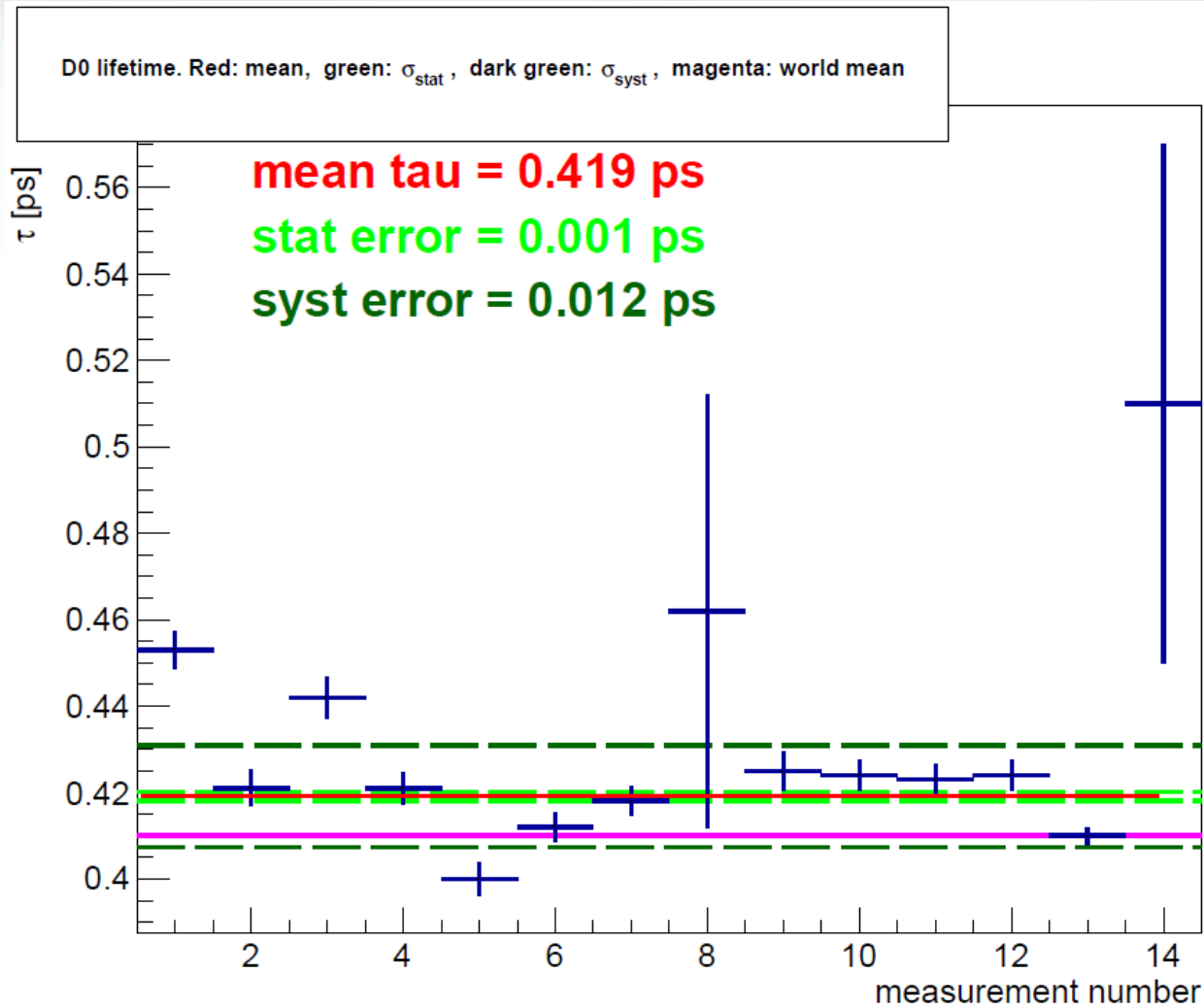
Masterclass 2022

Perugia 09.03.2022

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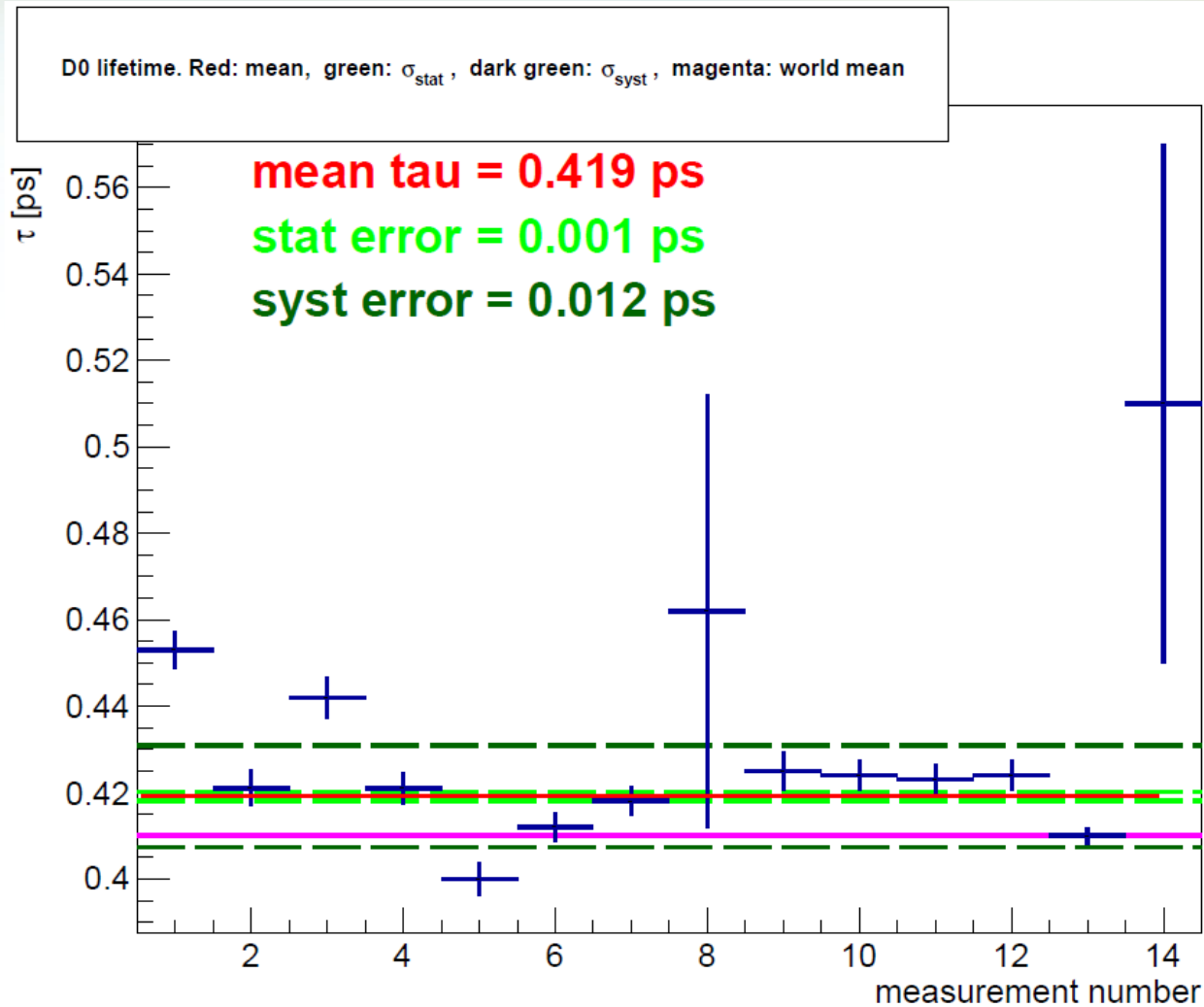


D0 lifetime



- 14 results obtained
- Blue points: your results
- Blue vertical lines: total error (stat + syst)
- #9 has probably a typo
- #8 has a large systematics
- #14 has a large fit error

D0 lifetime



Fit to obtain the mean lifetime: χ^2 minimization

$$\chi^2 \equiv \frac{(x_1 - \mu_1)^2}{\sigma_1^2} + \frac{(x_2 - \mu_2)^2}{\sigma_2^2} + \dots + \frac{(x_\nu - \mu_\nu)^2}{\sigma_\nu^2} = \sum_{i=1}^{\nu} \frac{(x_i - \mu_i)^2}{\sigma_i^2}$$

Good measurement: $\chi^2/\text{ndf} \sim 1$

ndf (number of degrees of freedom) = N(points) - N(fit parameters)

Mean value (M_Z) and its **stat error**

$$\overline{M}_Z = \frac{\sum M_i / \sigma_i^2}{\sum 1 / \sigma_i^2} \quad \text{and} \quad \sigma_{\overline{M}_Z}^2 = \frac{1}{\sum 1 / \sigma_i^2}$$

Syst error:

Add syst in order to achieve $\chi^2/\text{ndf} = 1$