Tests at Perugia

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Outline

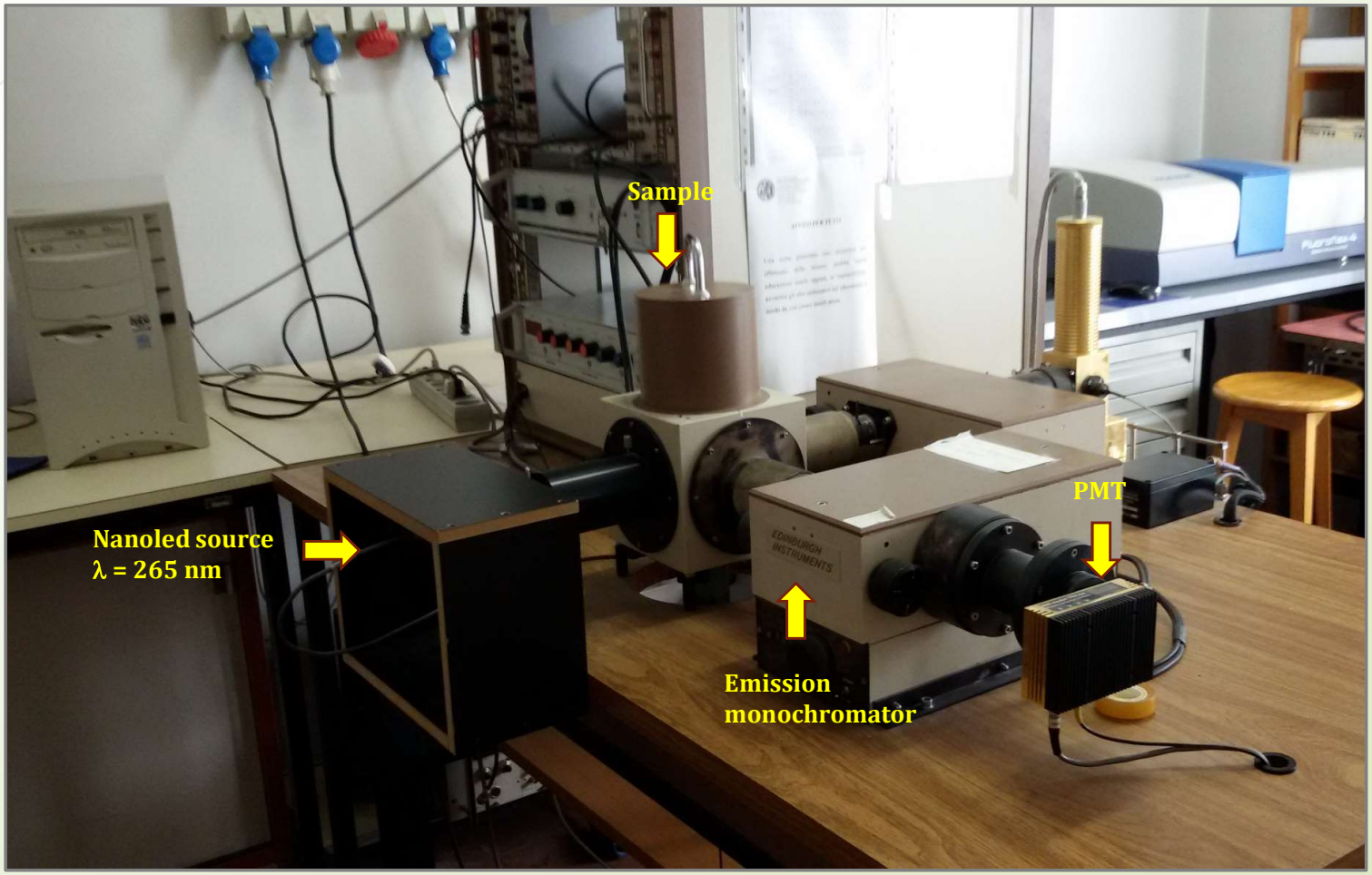
- optical measurements on LS samples based on Sasol and Helm LAB
- preliminary study on the excitation wavelength effects on LS emission
- conclusions and future developments

Optical measurements on LS samples based on Sasol and Helm LAB

Set-up for the emission measurements

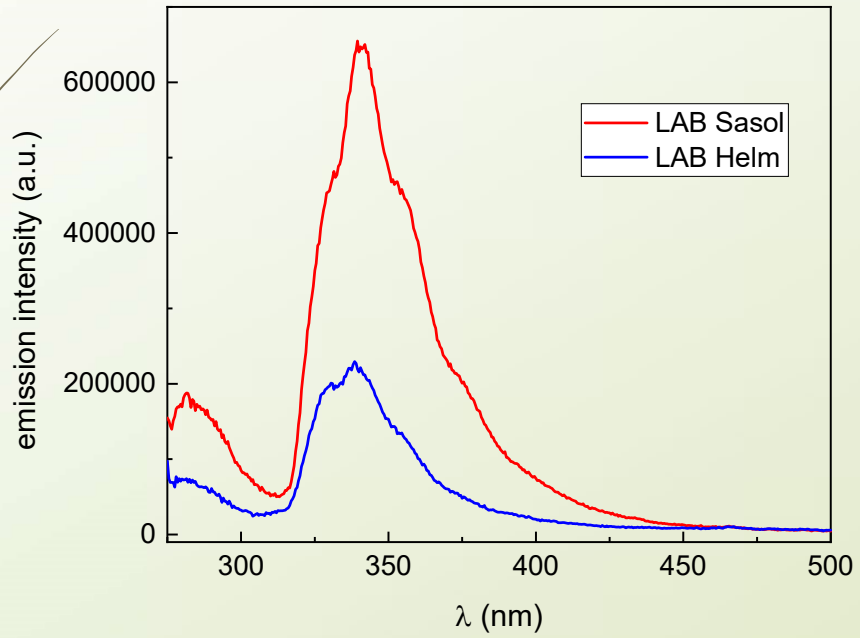
Optical measurements on LS samples based on Sasol and Helm LAB

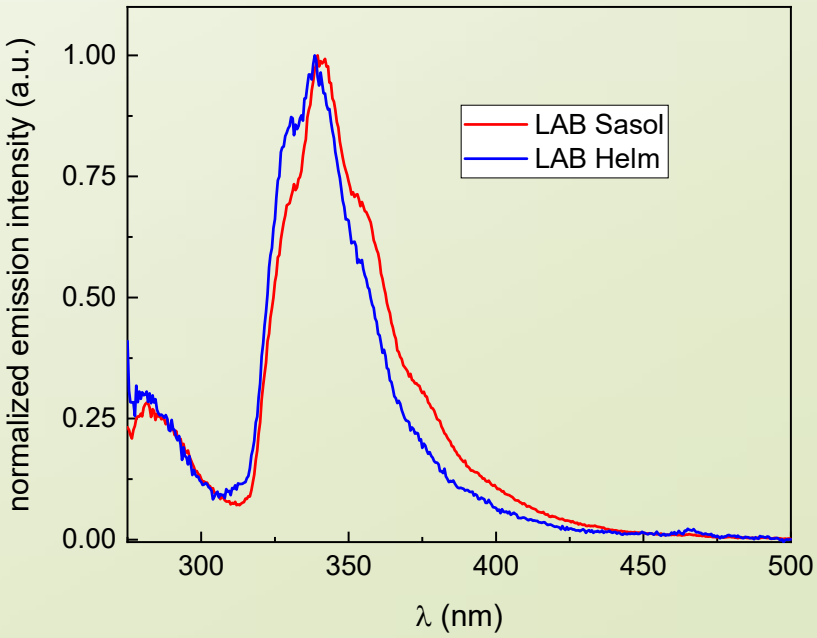
Set-up for the lifetime measurements



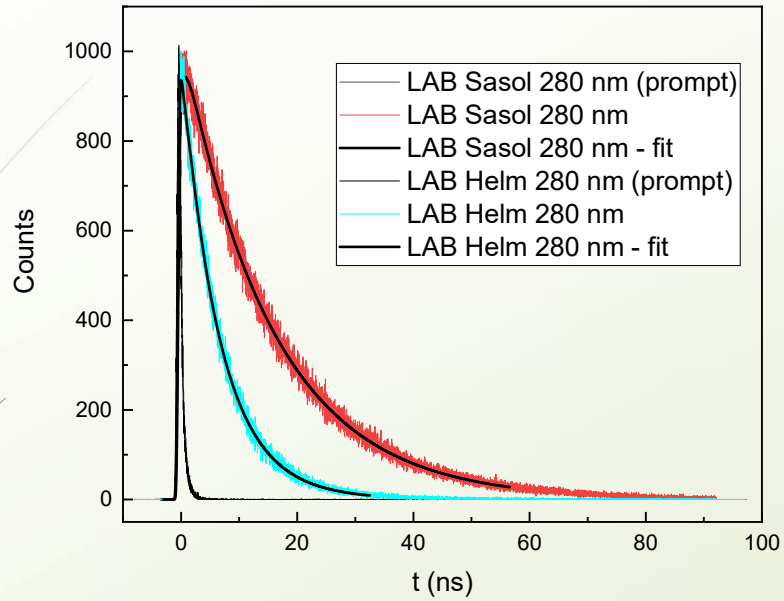
- **Two JUNO LS samples have been prepared, upon dissolving 2.5 g/L PPO and 3 mg/L Bis-MSB in two different LAB samples produced from Sasol and Helm**
- **The optical behaviour of the pure LAB samples was investigated first (λ_{exc} = 265 nm)**

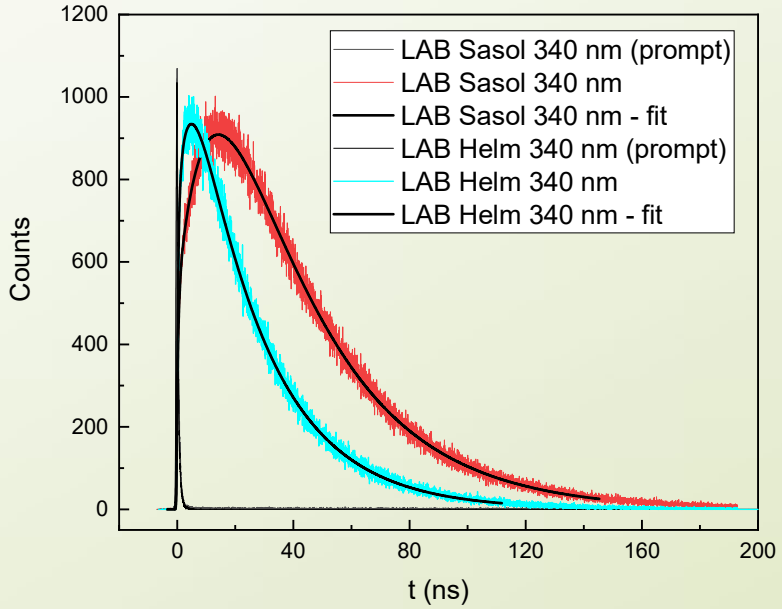
Emission spectra of LAB samples from Sasol and Helm





Fluorescence decay times of LAB samples from Sasol and Helm

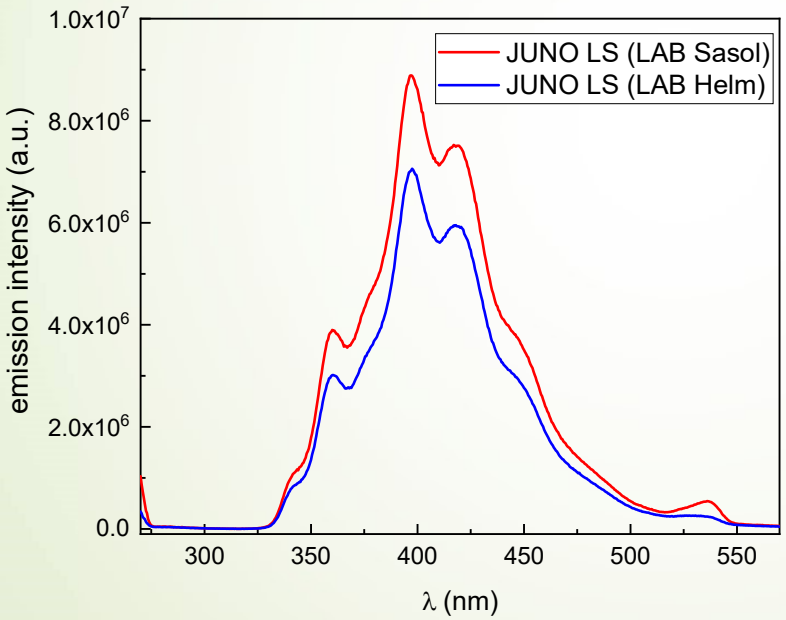


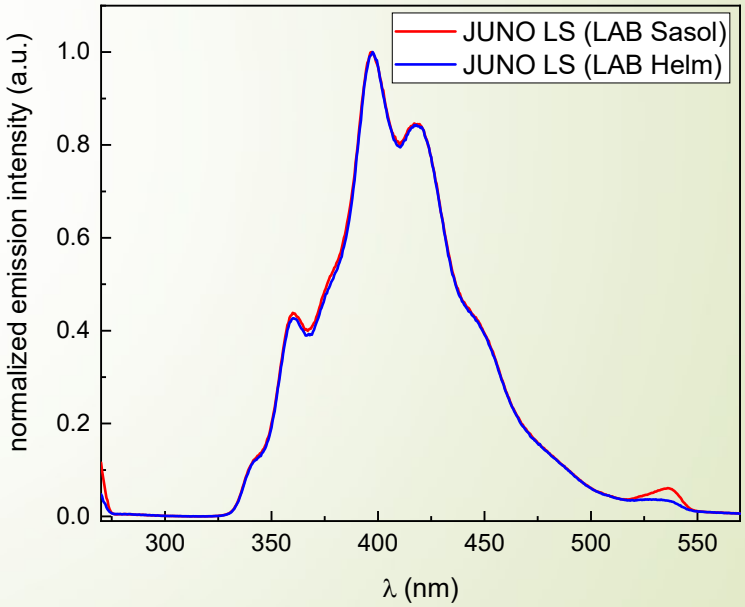


	Aerated				N_2 degassed			
	τ_1 (ns) 280 nm	τ_2 (ns) 280 nm	τ_1 (ns) 340 nm	τ_2 (ns) 340 nm	τ_1 (ns) 280 nm	τ_2 (ns) 280 nm	τ_1 (ns) 340 nm	τ_2 (ns) 340 nm
SASOL	15.6 ± 0.5	-	13.1 ± 0.4	30.3 ± 0.9	21.8 ± 0.7	-	16.7 ± 0. 5	50.9 ± 1.5
HELM	5.7 ± 0.2	8.6 ± 0.3	4.3 ± 0.1	24.5 ± 0.7	10.1 ± 0.3	16.4 ± 0.5	7.8 ± 0.2	39.8 ± 1.2

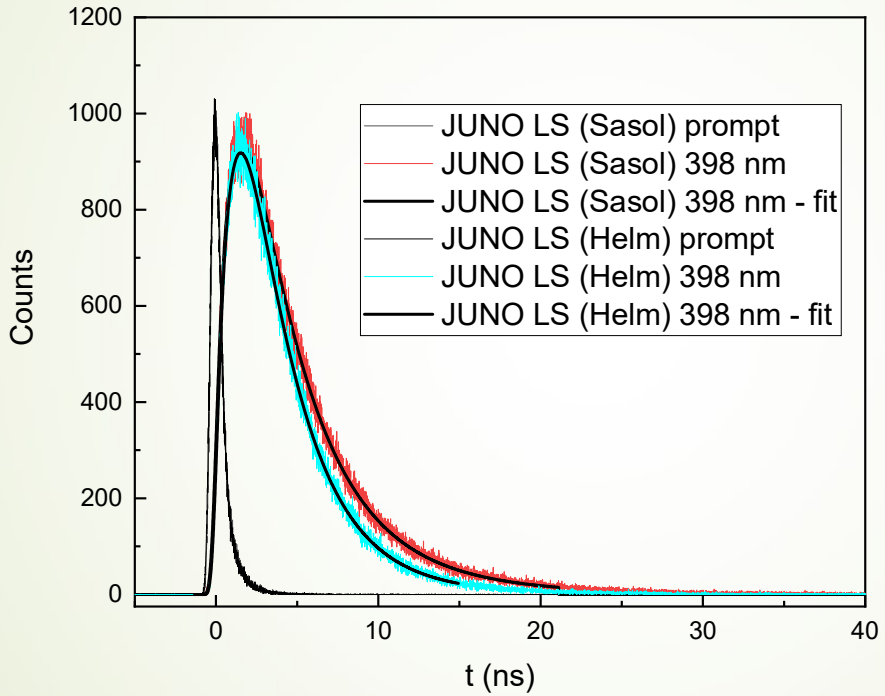
- **Once the optical behaviour of the pure LAB samples had been analyzed, the emission spectra of the JUNO LS samples (LAB + 2.5 g/L PPO + 3 mg/L Bis-MSB) were investigated**

Emission spectra of JUNO LS samples based on Sasol and Helm LABs





Fluorescence decay times of JUNO LS samples based on Sasol and Helm LABs



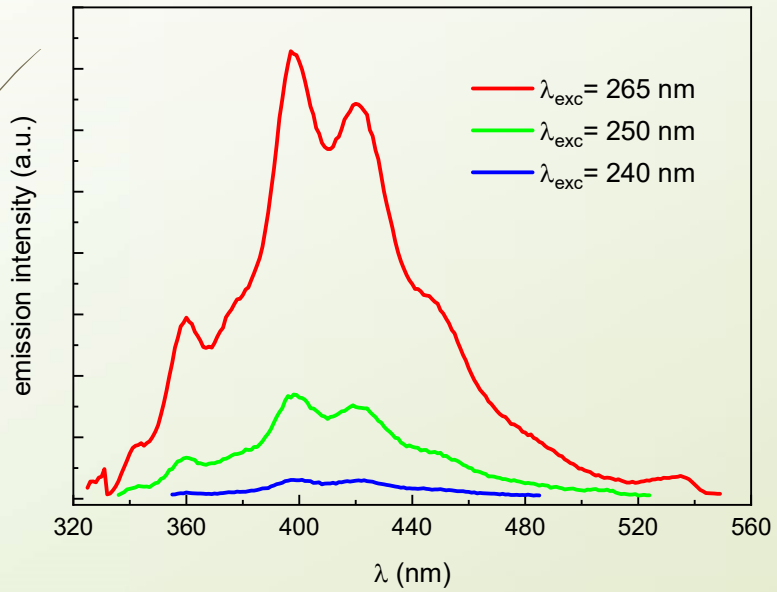
- **The samples were excited at λ_{exc} = 265 nm**
- **The decay signals were recorded at different emission wavelenghts, corresponding to the various emission peaks**

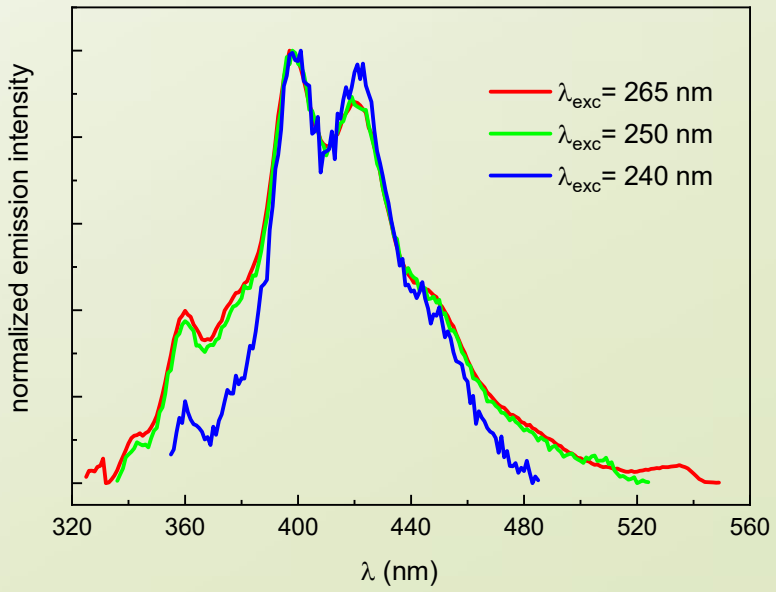
Fluorescence decay times of JUNO LS samples based on Sasol and Helm LABs

	Aerated						N_2 degassed					
	340 nm	**360 nm**	**398 nm**	**419 nm**	**448 nm**	**484 nm**	**340 nm**	**360 nm**	**398 nm**	**419 nm**	**448 nm**	**484 nm**
SASOL												
r.t (ns)	~ 0.7	~ 0.8	~ 0.9	~ 1.1	~ 1.4	~ 2.1	~ 0.8	~ 0.7	~ 0.9	~ 1.2	~ 1.7	~ 1.7
τ_1 (ns)	2.8 ± 0.1	2.7 ± 0.1	3.5 ± 0.1	3.2 ± 0.1	3.0 ± 0.1	2.1 ± 0.1	3.1 ± 0.1	3.3 ± 0.1	3.8 ± 0.1	3.3 ± 0.1	2.5 ± 0.1	3.0 ± 0.1
τ_2 (ns)	5.6 ± 0.2	5.3 ± 0.2	7.1 ± 0.2	5.8 ± 0.2	6.0 ± 0.2	6.1 ± 0.2	6.3 ± 0.2	6.6 ± 0.2	7.8 ± 0.2	6.5 ± 0.2	6.2 ± 0.2	7.5 ± 0.2
HELM												
r.t (ns)	~ 0.5	~ 0.6	~ 0.9	~ 1.2	~ 1.6	~ 2.0	~ 0.5	~ 0.6	~ 0.9	~ 1.2	~ 1.6	~ 1.8
τ_1 (ns)	3.0 ± 0.1	3.1 ± 0.1	3.1 ± 0.1	2.9 ± 0.1	2.3 ± 0.1	2.0 ± 0.1	3.6 ± 0.1	3.6 ± 0.1	3.6 ± 0.1	3.4 ± 0.1	2.5 ± 0.1	2.6 ± 0.1
τ_2 (ns)	-	-	8.0 ± 0.2	6.5 ± 0.2	4.7 ± 0.1	6.1 ± 0.2	-	-	8.5 ± 0.3	6.5 ± 0.2	5.5 ± 0.2	6.6 ± 0.2

Preliminary study on the excitation wavelength effects on LS emission

- **Considering the possibile secondary emission induced by Cherenkov radiation in the LS, some preliminary measurements on the excitation wavelength effect on the emission spectra of the JUNO LS (LAB + 2.5 g/l PPO, 3 mg/l BisMSB) were carried out in collaboration with INFN Milano**





Conclusions and future developments

- Under the same experimental conditions, the LS based on Sasol LAB shows a higher light yield than the LS based on Helm LAB
- This result surely reflects the large differences in both light yields and decay lifetimes of the two LABs
- The emission lifetimes are always longer in the case of the LS based on Sasol LAB
- Measurements using the actual LAB of the JUNO experiment would be of sure interest
- Some very preliminary measurements on the excitation wavelength effect on the emission spectra of the JUNO LS have been carried out
- The wavelength effect needs to be analyzed over a larger interval, after optimization of the experimental parameters
- The investigation of the excitation wavelength effect on the PPO and Bis-MSB fluors might be carried out in a solvent that does not absorb in the wavelength range of interest (e.g. cyclohexane)