
A 20 cm long LYSO Sample from SIC

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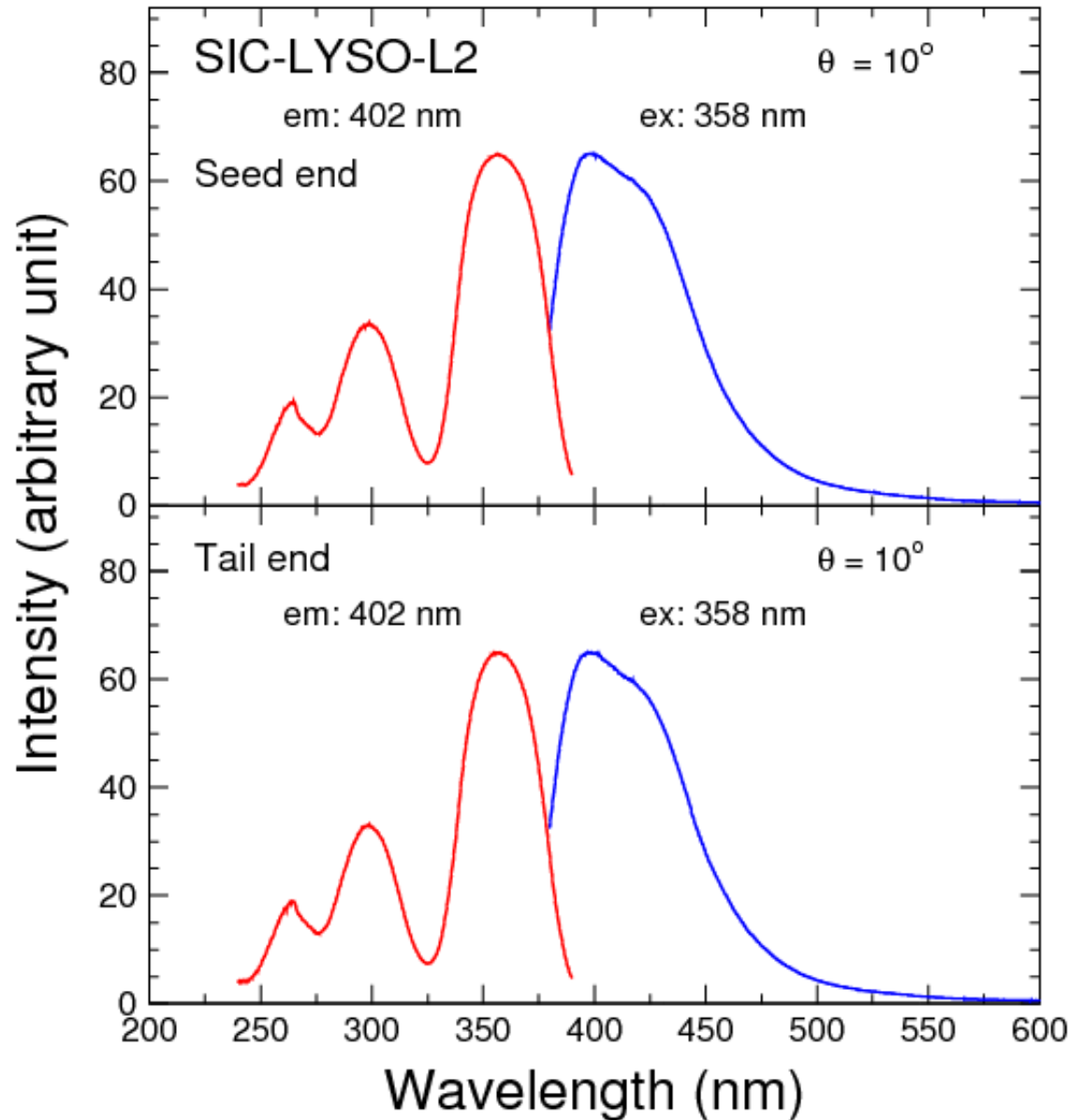
December 14, 2010

Optical and Scintillation Properties Measured

A 25 x 25 x 200 mm sample was received from SIC on November 10, 2010, with the following properties measured.

- Excitation and Emission Spectra
- Optical transmittance, and compared to other growers
- [Ce] extracted from growth parameters and corresponding light output along crystal
- Light response uniformity and energy resolution by PMT (R1306, grease coupling, gate 200ns, Na-22 source), and compared to other growers
- Light response uniformity by APD (2 x S8664-55, grease coupling, shaping 250 ns, Na-22 source)
- Relative L.O. to a candle by PMT (R1306, air gap, Na-22), and compared to other growers

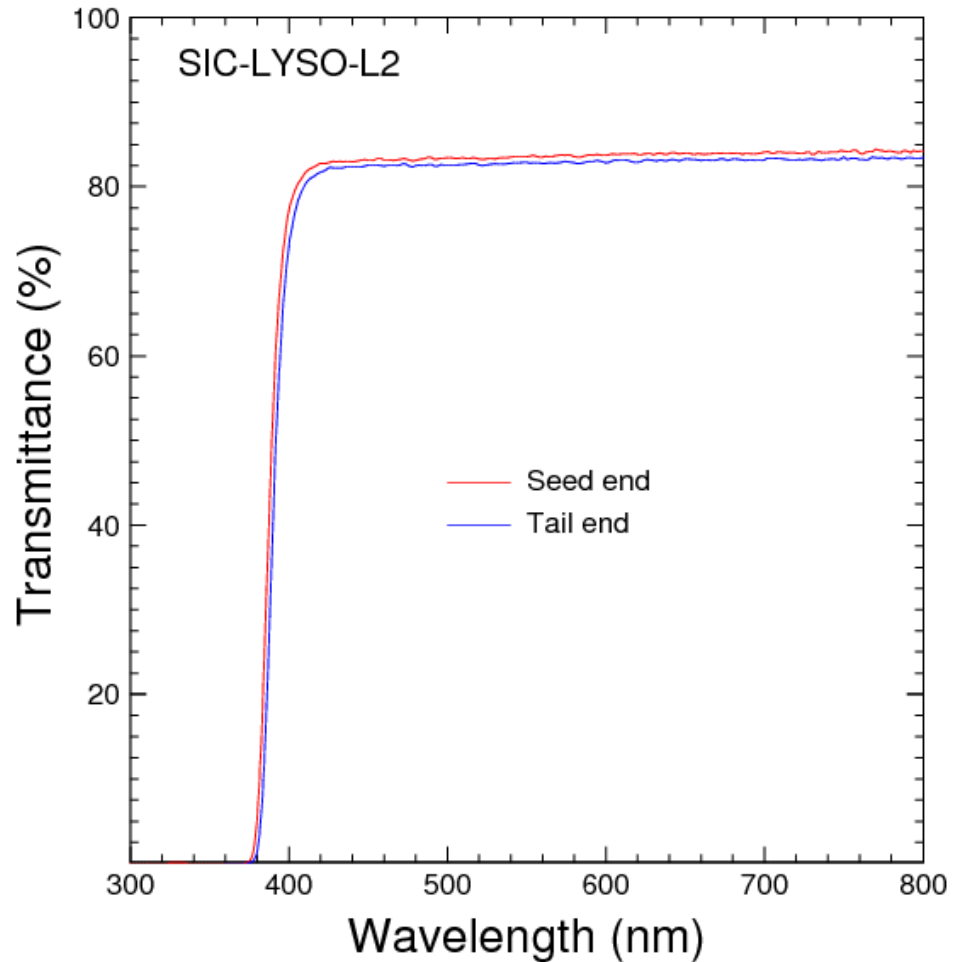
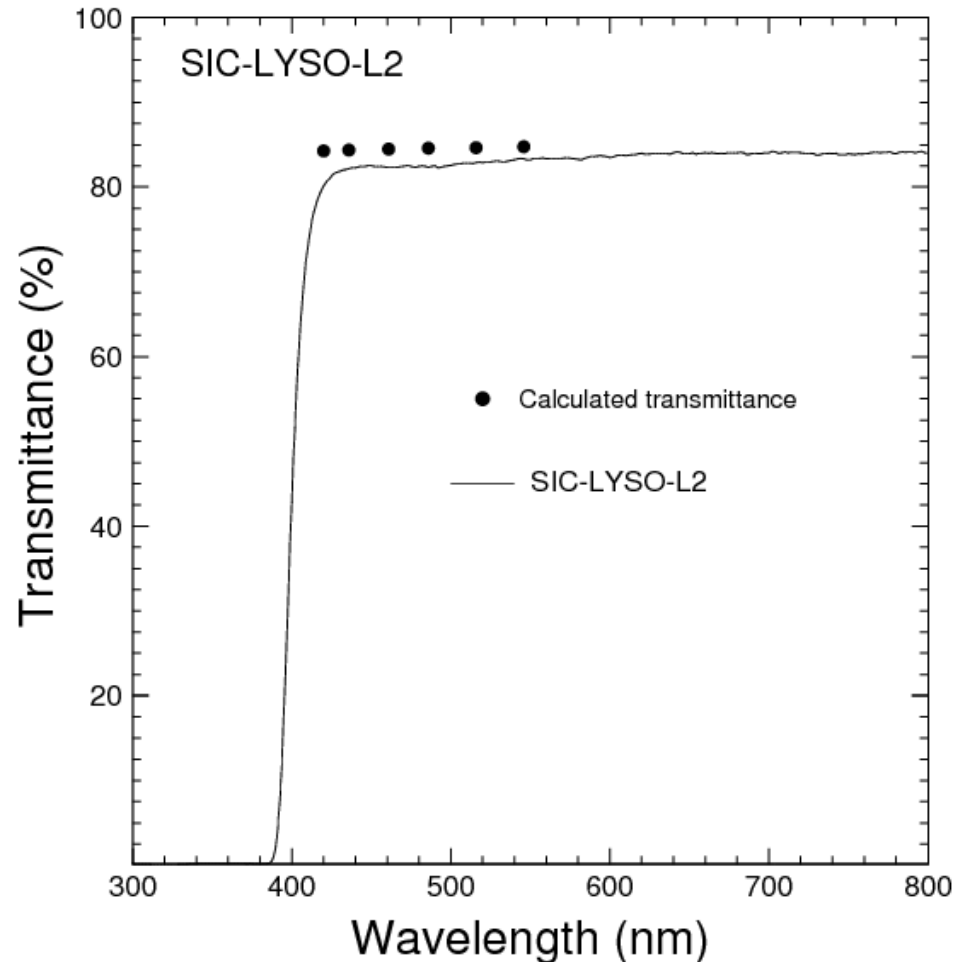
Excitation and Emission Spectra



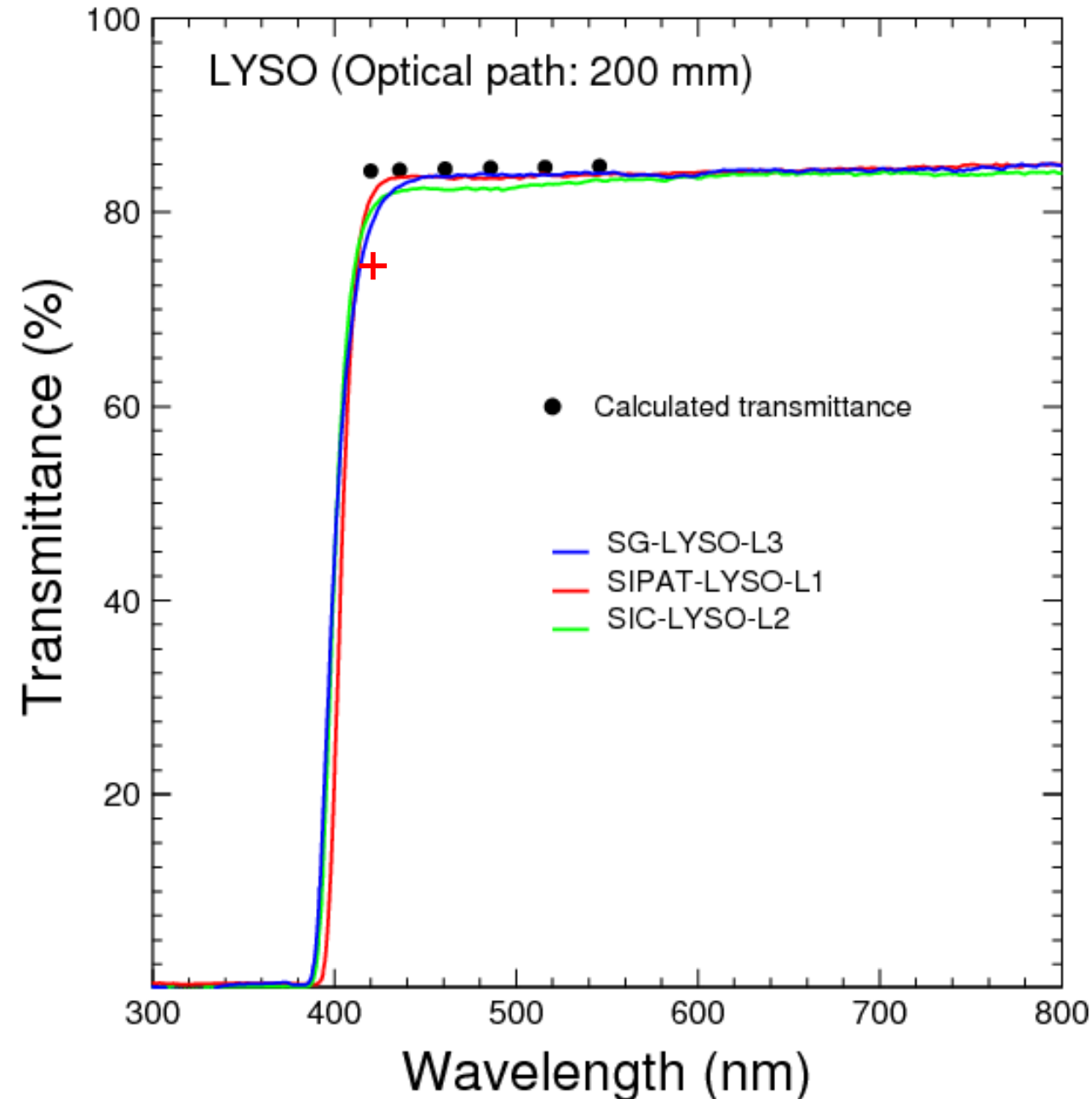
Consistent
emission at
both ends

Optical Transmittance: LT and TT

Good optical transmittance

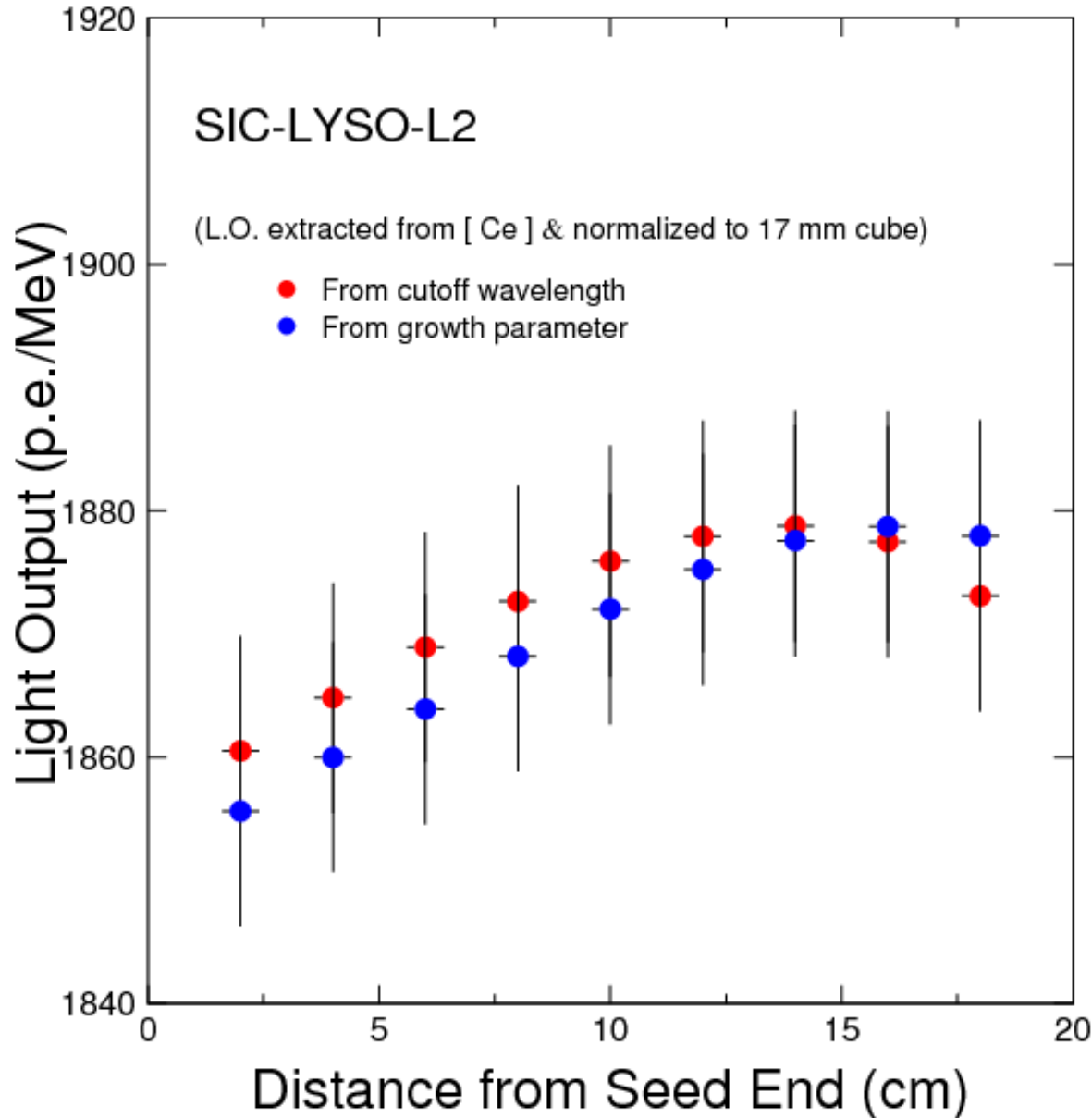


Comparison of Longitudinal Transmittance



There might be a room of improvement between 400 and 600 nm

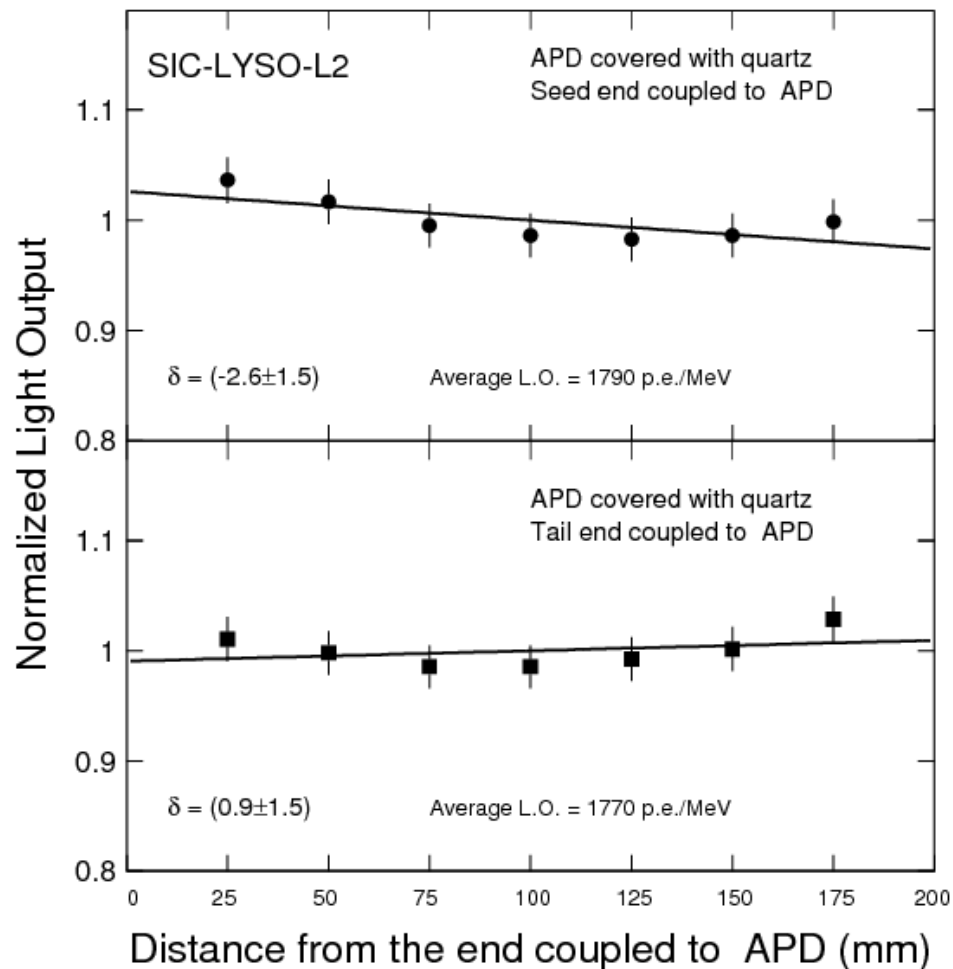
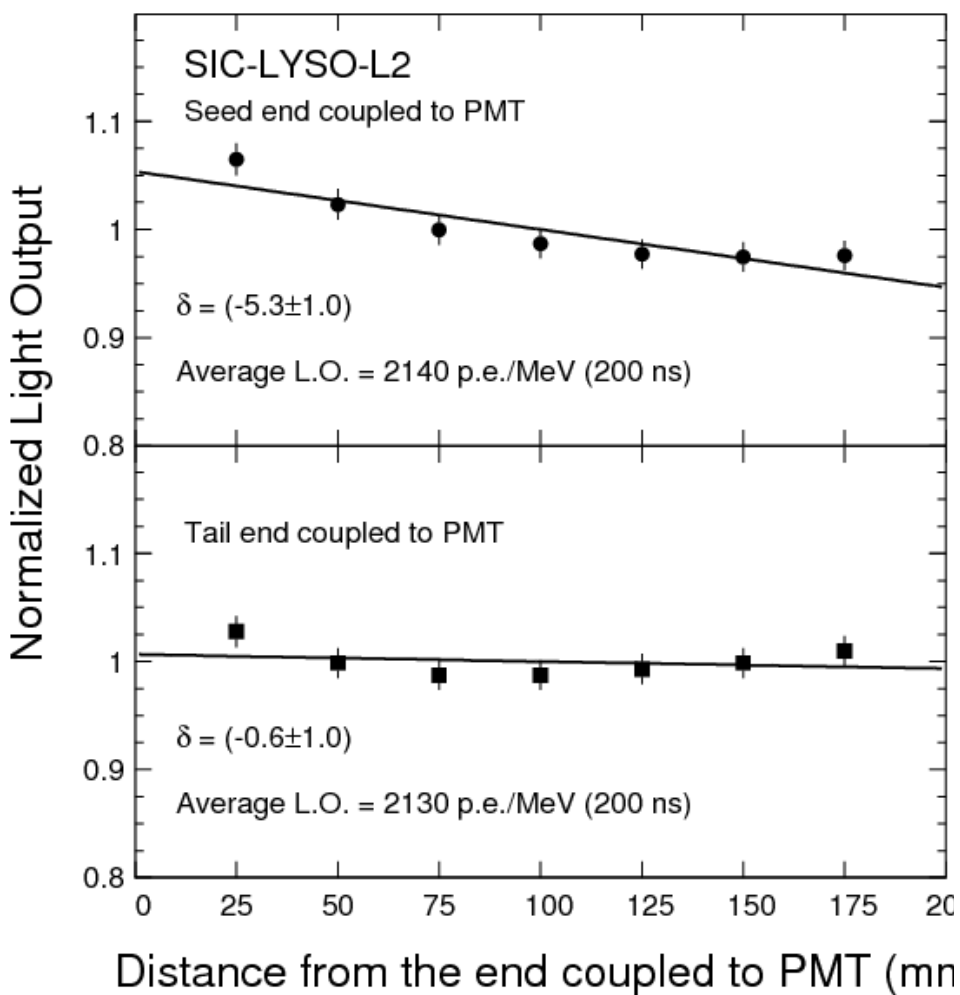
L.O. Expected from Calculated [Ce]



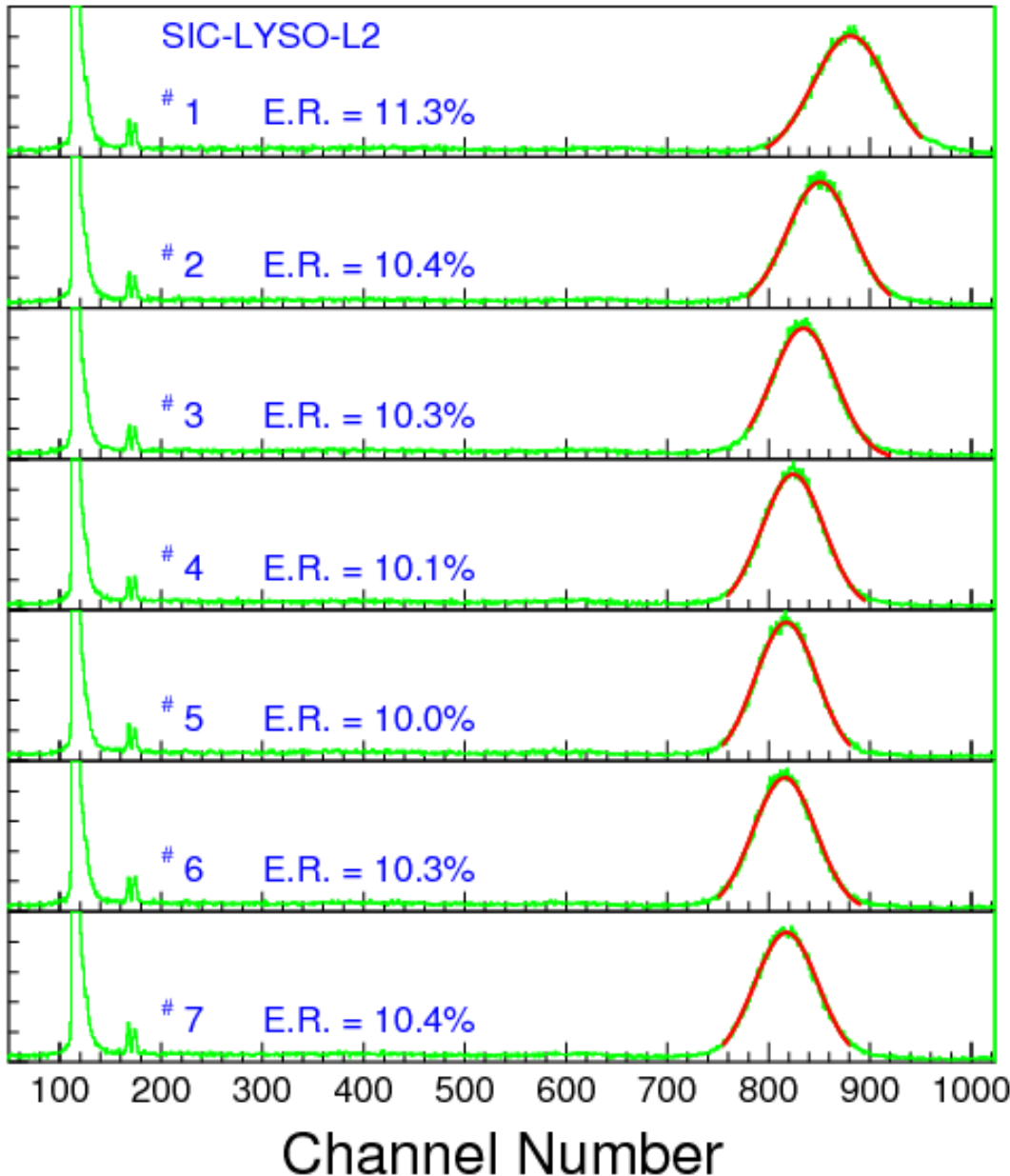
Consistent [Ce] are calculated by using the segregation coefficient and the cut-off wavelength. It seems more or less optimized.

Light Response Uniformity: PMT & APD

Consistent uniformity between PMT and APD Readout



FWHM Energy Resolution Measured with R1306 PMT



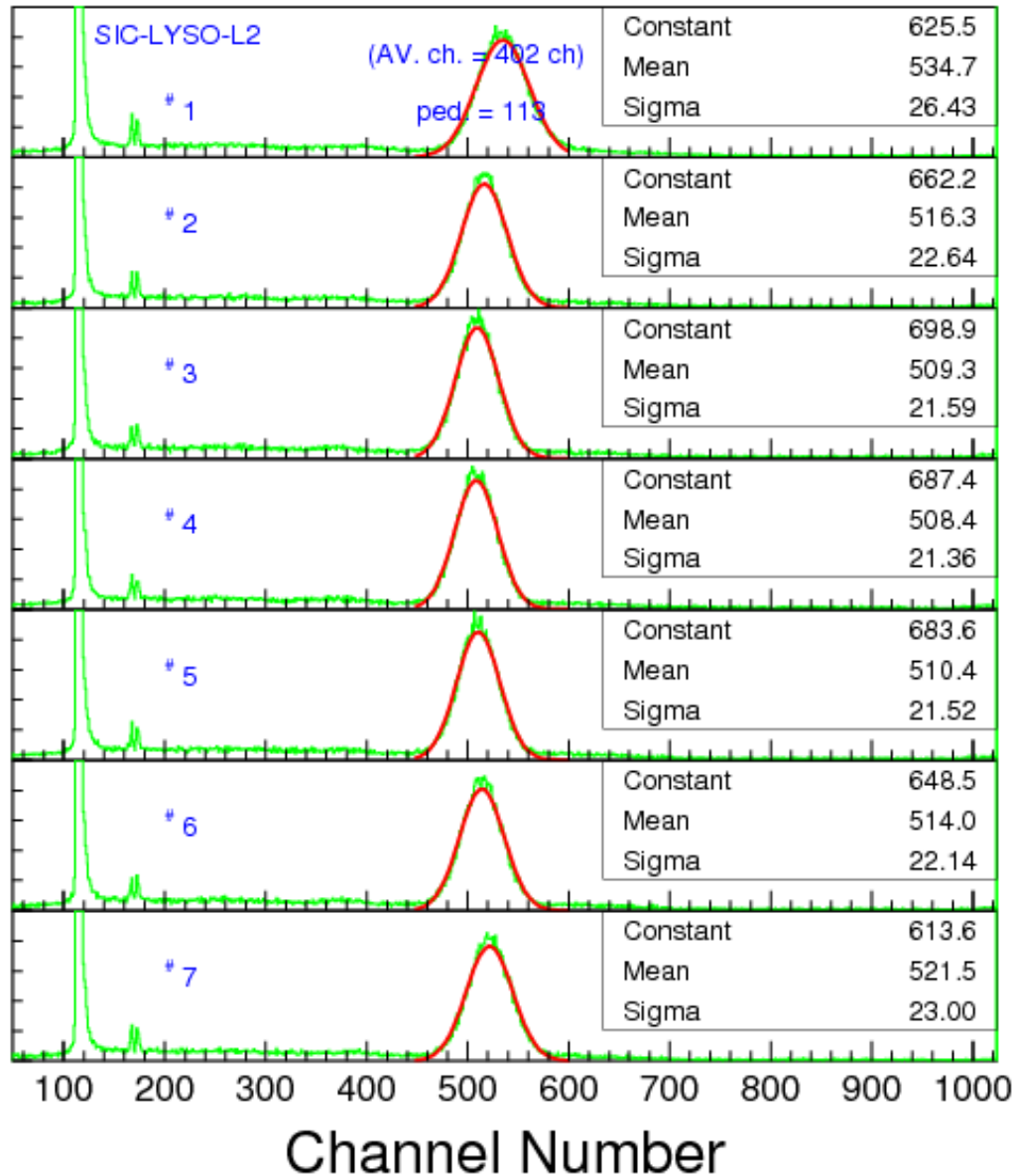
10.0% to 11.3%

Comparison of FWHM Energy Resolution

Better than early SIPAT Samples

	FWHM Energy Resolution at different points (%)							Mean value (%)
Sample ID	1	2	3	4	5	6	7	
SG-3	9.7	9.4	9.2	8.9	8.8	8.8	8.8	9.1
SIPAT-1	13.2	12.5	12.3	12.1	12.3	12.4	12.4	12.5
SIPAT-5	12.6	11.8	11.5	11.3	10.9	11.0	11.1	11.5
SIPAT-6	12.3	11.6	11.3	10.9	10.6	10.3	10.2	11.1
SIC-2	11.3	10.4	10.3	10.1	10.0	10.3	10.4	10.4

Relative Light Output



Comparison of Relative Light Output

	Relative L.O. = 100 x L.O. (large sample) / L.O. (candle) (%)
Sample ID	Candle1 (618ch)
SG-3 (350ch)	56.6
SIPAT-1 (289ch)	46.8
SIPAT-5 (360ch)	58.3
SIPAT-6 (269ch)	43.5
SIC-2 (402ch)	65.0

Summary

- This 20 cm long LYSO sample has quite good overall quality with its light output one of the best.
- Next step for SIC: a type 8 crystal.