

Light Scattering Measurement in the water using the Super-Kamiokande Detector

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Overview

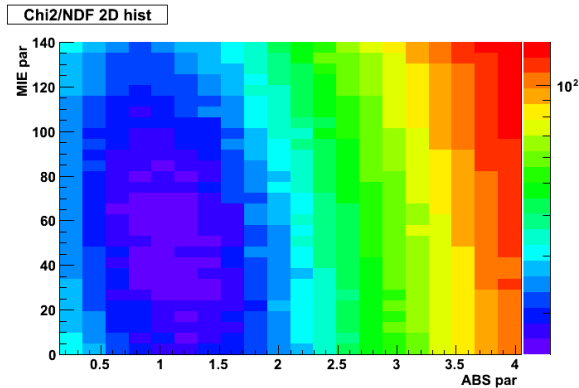
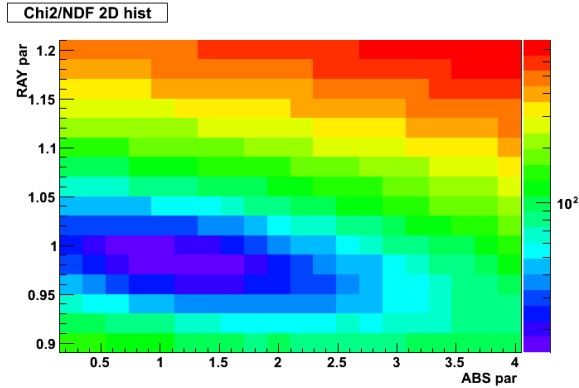
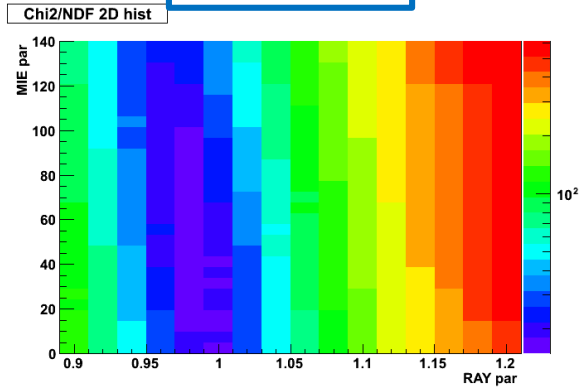
- Title:
Light Scattering Measurement in the Water Using
the Super-Kamiokande Detector (ref no A01)
- Principal Investigator
Intae Yu (Sungkyunkwan University, Korea)
- Budget
200,000 Yen

Analysis of SK5 Water Parameters

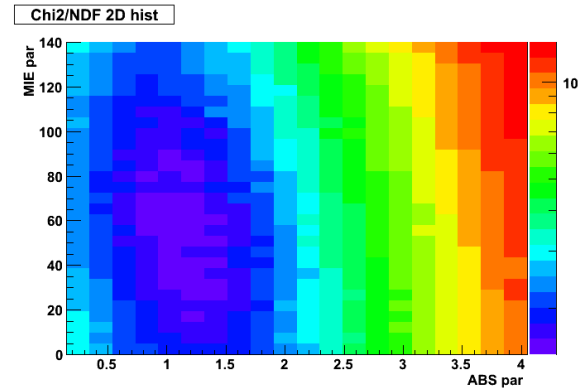
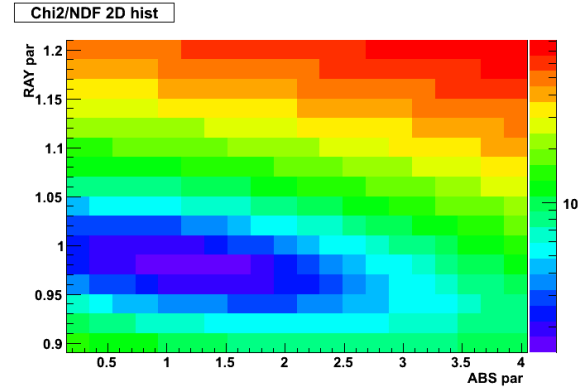
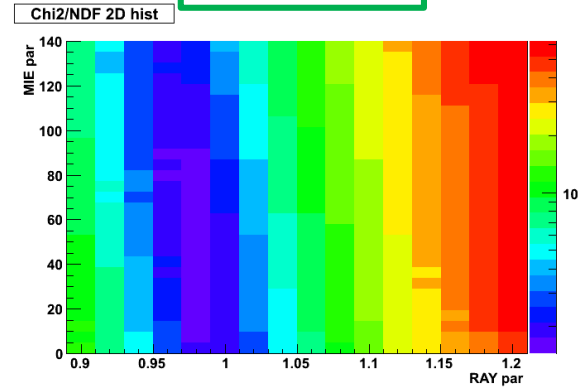
- SK5 water parameter tuning
 - remove unnecessary runs
 - extend parameter fitting ranges
 - improve systematics
 - obtain water parameters for SK5
- SK5 reference period
 - Aug.20 – Sep.19, 2019

2D combined χ^2 distribution & Timing shift study – 405nm

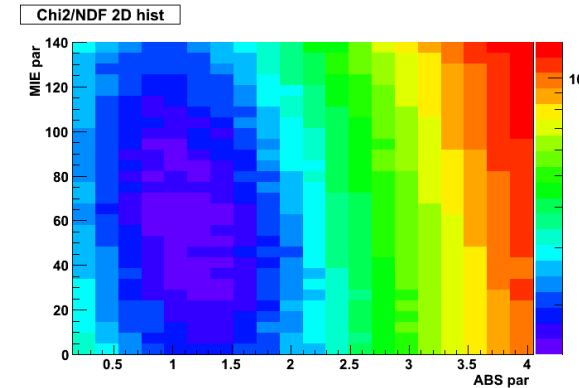
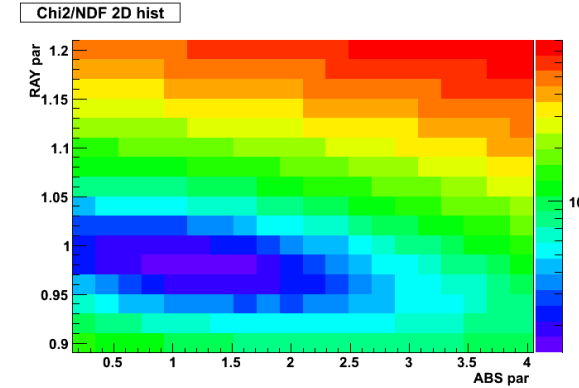
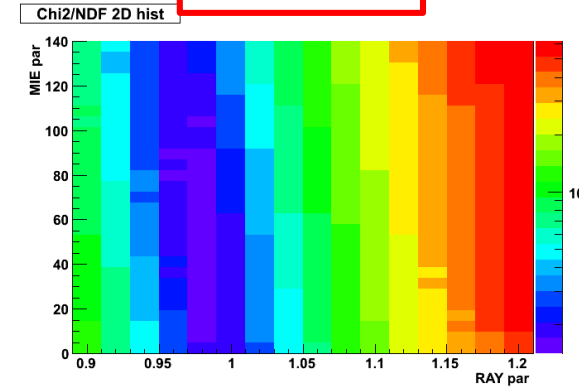
- 0.1 ns



standard



+ 0.1 ns



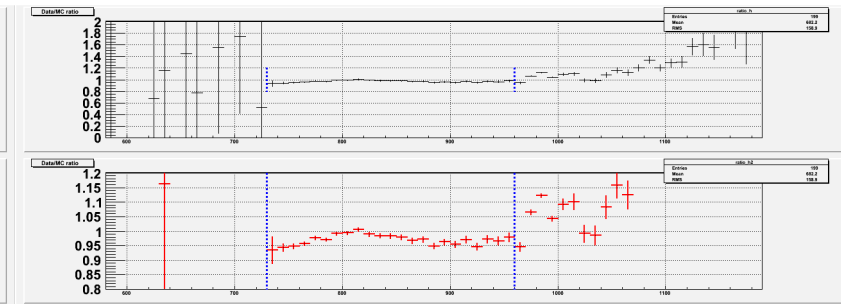
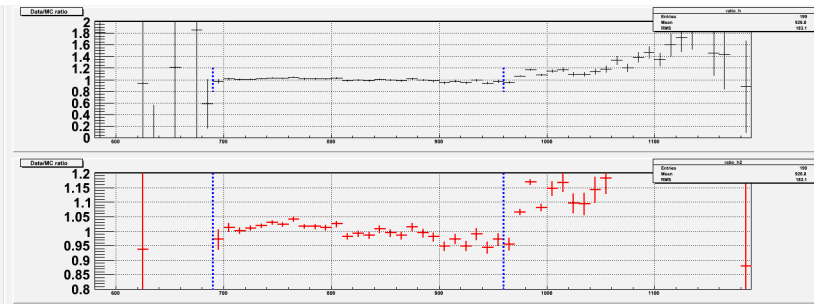
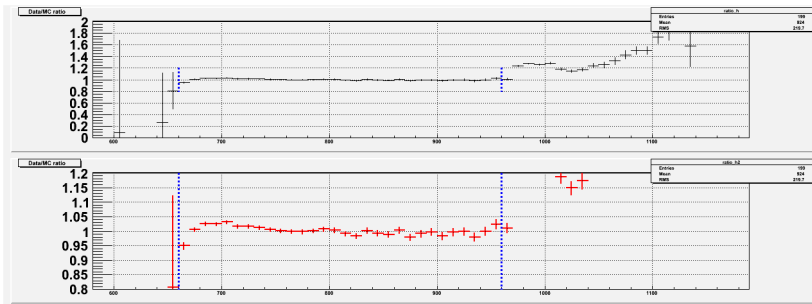
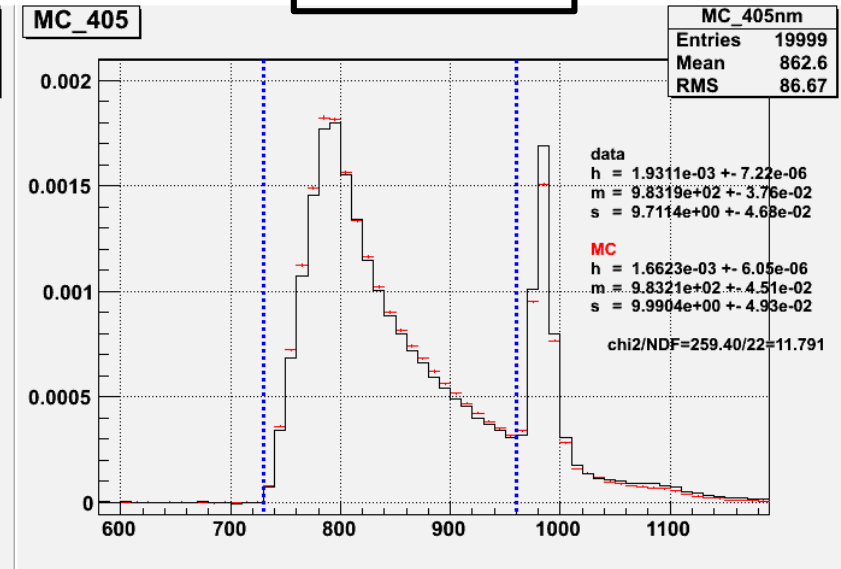
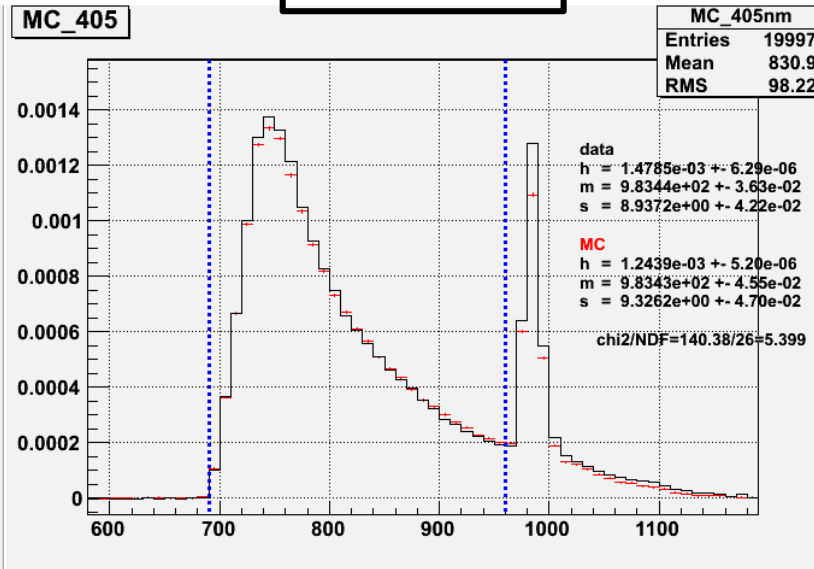
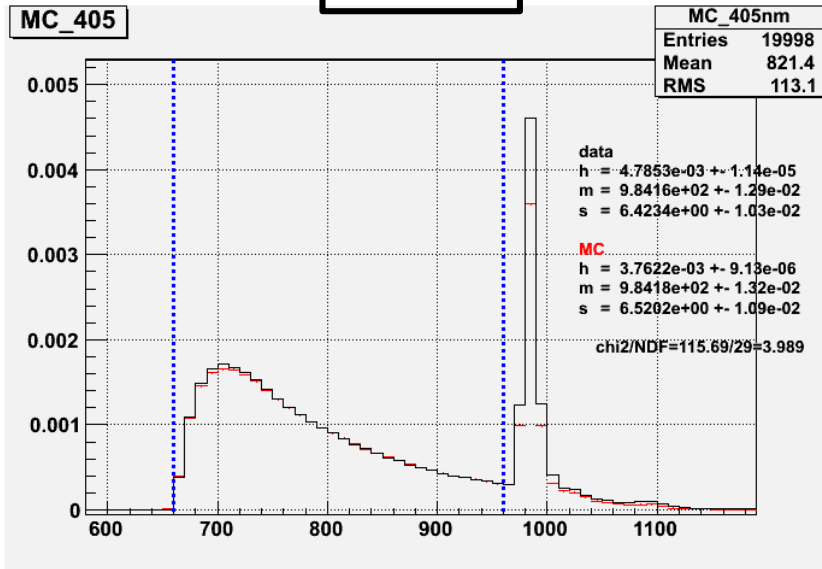
χ^2 fitting with timing shifted MC and data to estimate systematic uncertainties

timing distribution at each region – 405nm

Top

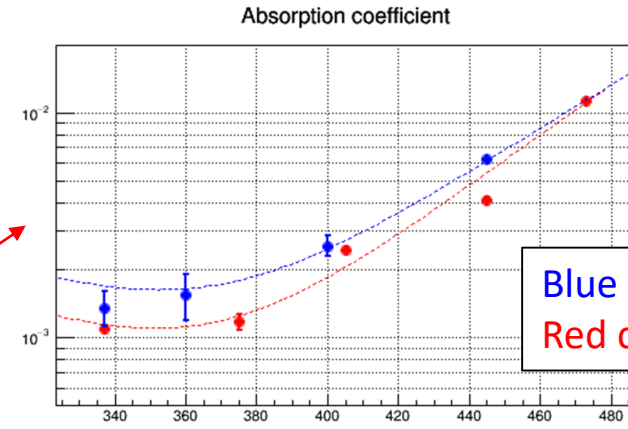
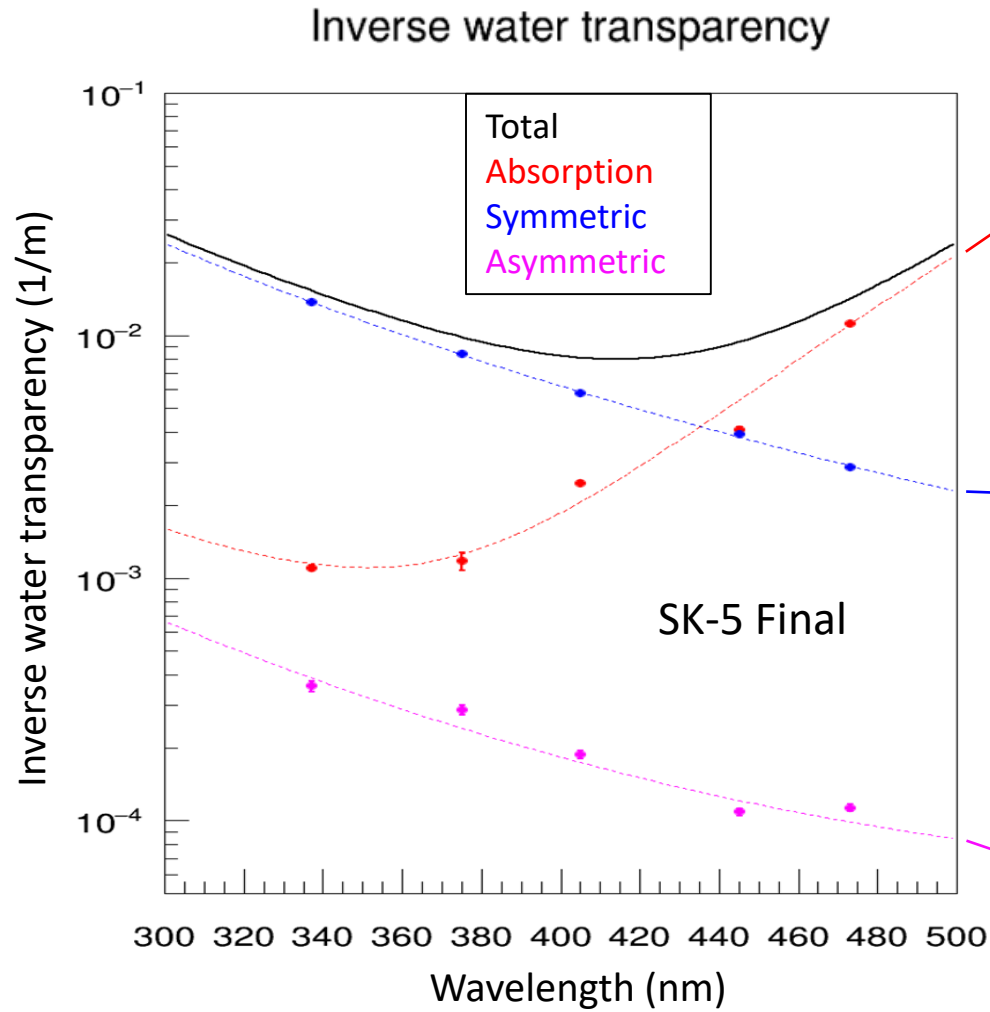
Barrel 1

Barrel 2

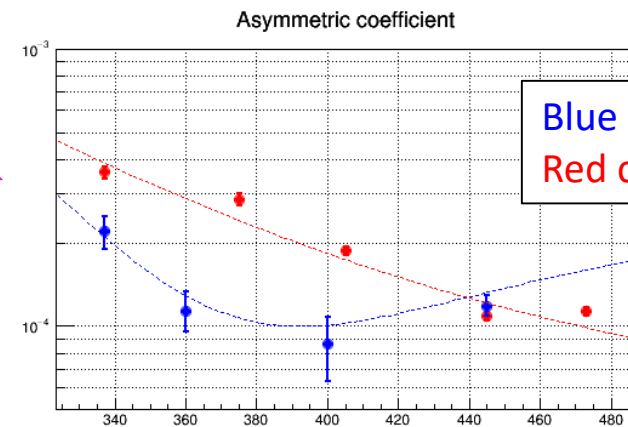
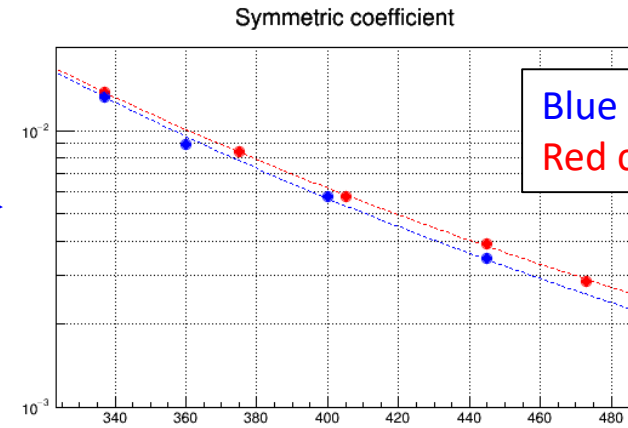


- Blue vertical dashed line = χ^2 fitting range (scattering region)

Inverse water transparency



SK4 Official results include time variance. SK5 is not



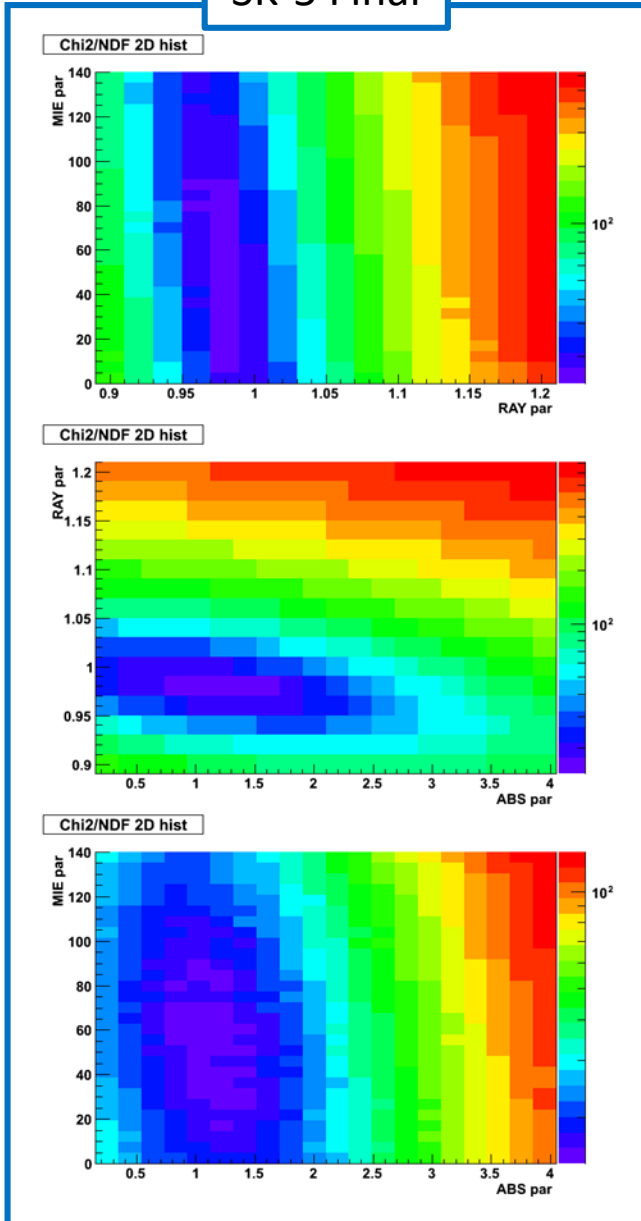
“SK4 Official” is the result of SK4 NIM paper (1307.0162, 20 Dec 2013)
Data points of “SK4 Official” are obtained via NIM paper’s plot using pixel digitizer

SK6 preliminary water parameter measurement

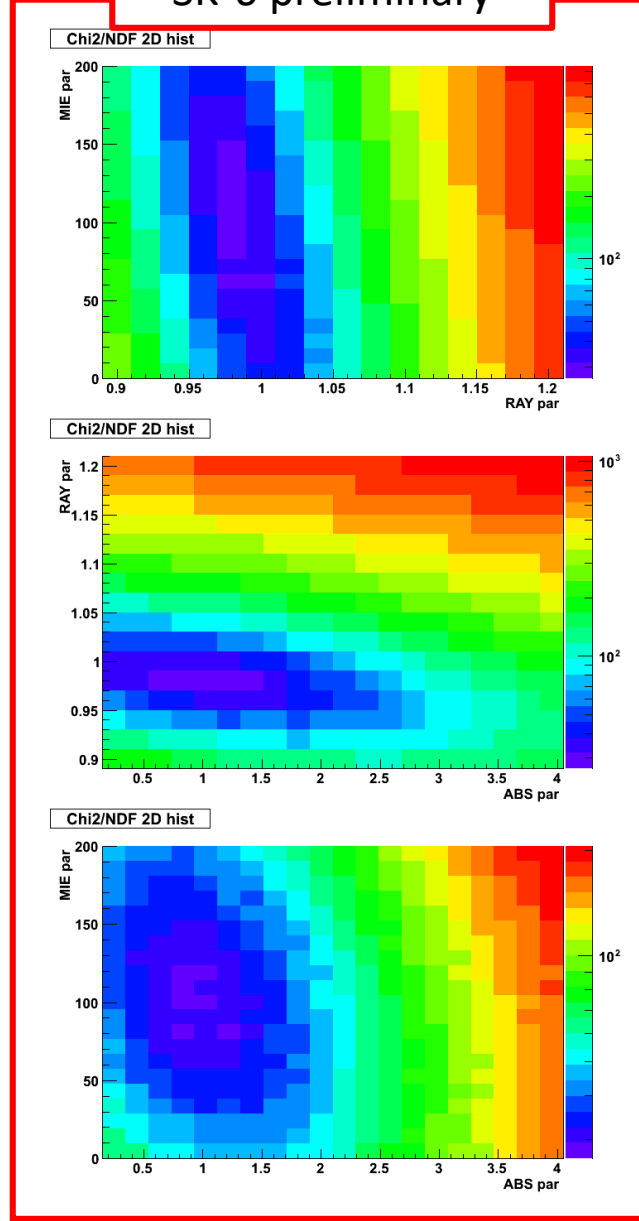
- SK6 preliminary water parameter measurement
 - Gadolinium loaded
 - Extension of asymmetric parameter region
- SK6 reference period
 - 2021, Jan. 1st – Feb. 1st

2D combined χ^2 /NDF distribution – 405nm

SK-5 Final

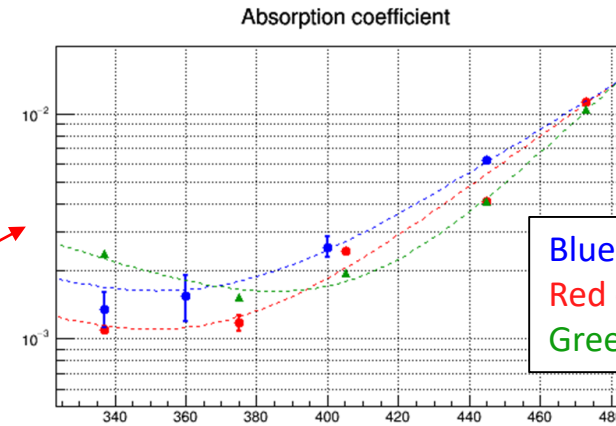
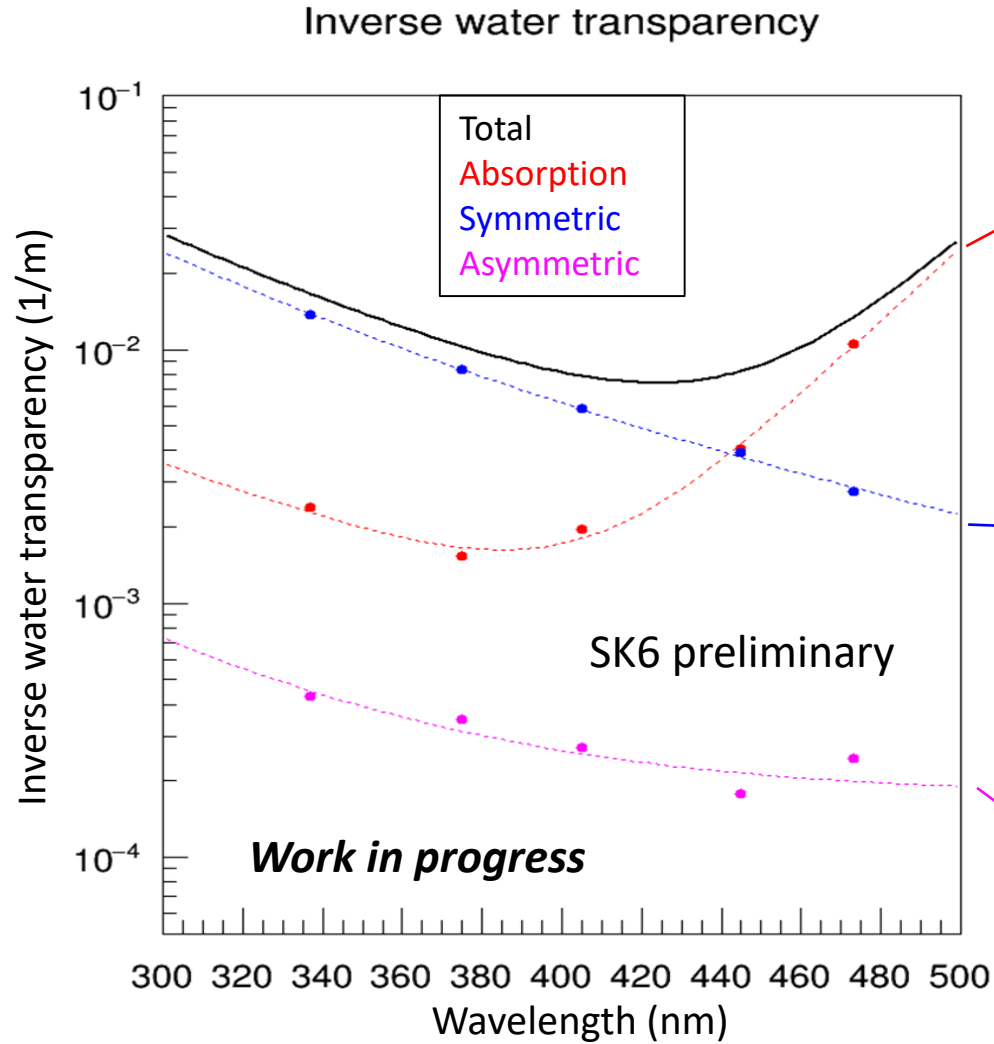


SK-6 preliminary



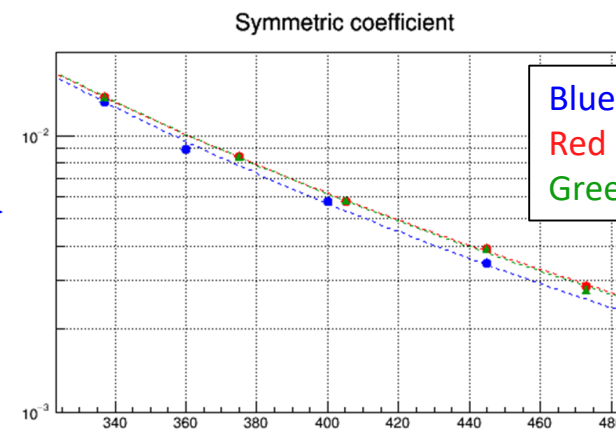
- χ^2 fitting results of SK5 final and SK6 preliminary

Inverse water transparency

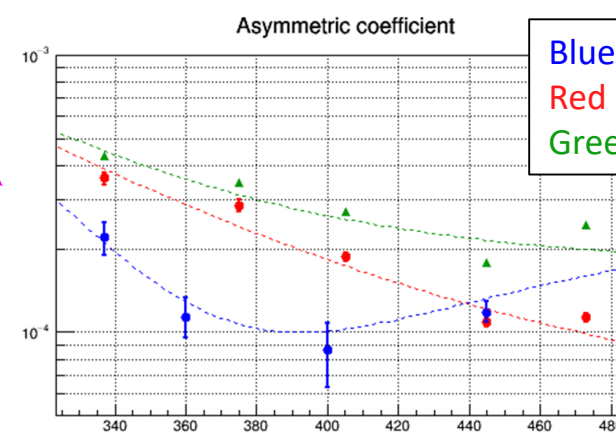


SK4 Official results include time variance. SK5 and SK6 is not

Blue circle : SK4 official
Red circle : SK5 final
Green triangle : SK6 preliminary



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Red circle : SK5 final
Green triangle : SK6 preliminary



Blue circle : SK4 official
Red circle : SK5 final
Green triangle : SK6 preliminary

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Summary

- **SK6 water quality has been stable since 2021 Jan.**
 - Keep monitoring SK6 water quality
- SK5 water parameter measurement
 - **SK-5 water parameter tuning was finished and the results were passed to SKDETSIM group in 2021**
- SK6 preliminary water parameter measurement was done
- SK6 2nd water parameter measurement is in progress