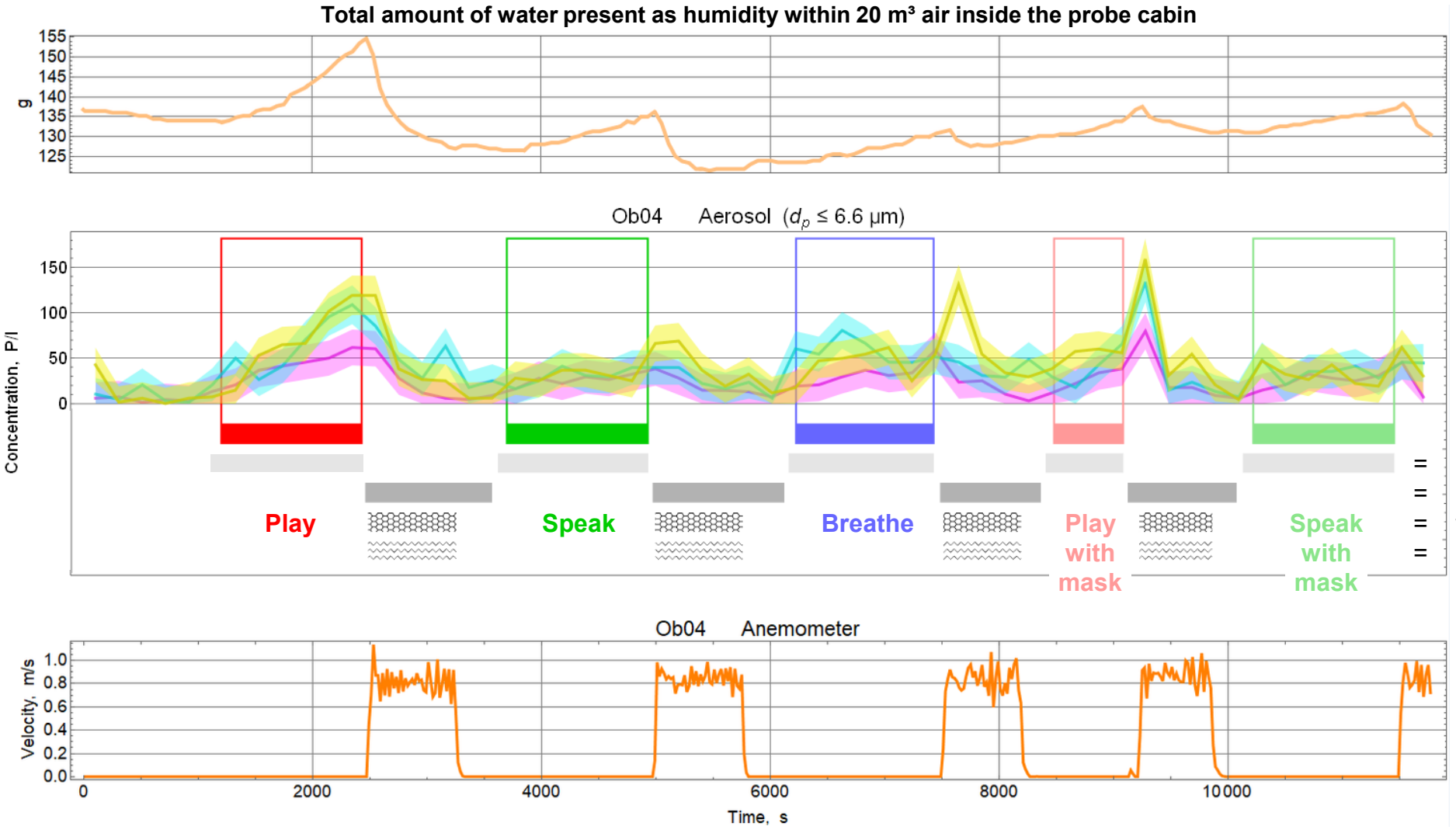
Overview of measurement data per proband, example: Oboe O4

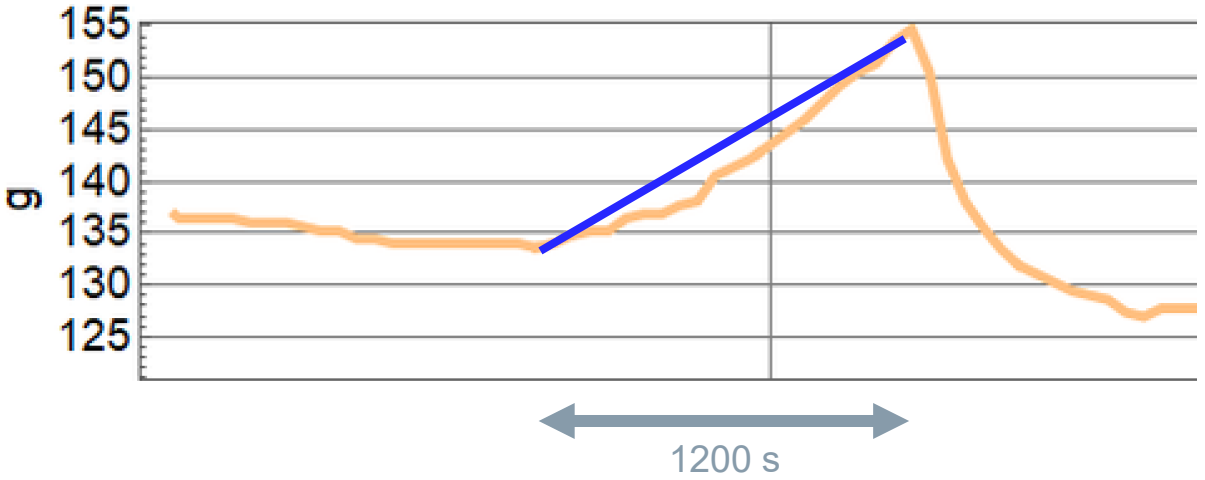
Colors assigned to tasks and spectrometer positions



Calculated from relative humidity, temperature, pressure and cabin space volume. See, e.g., https://cactus2000.de/js/calchum.pdf

Amount of water released by proband (mainly exhalation)

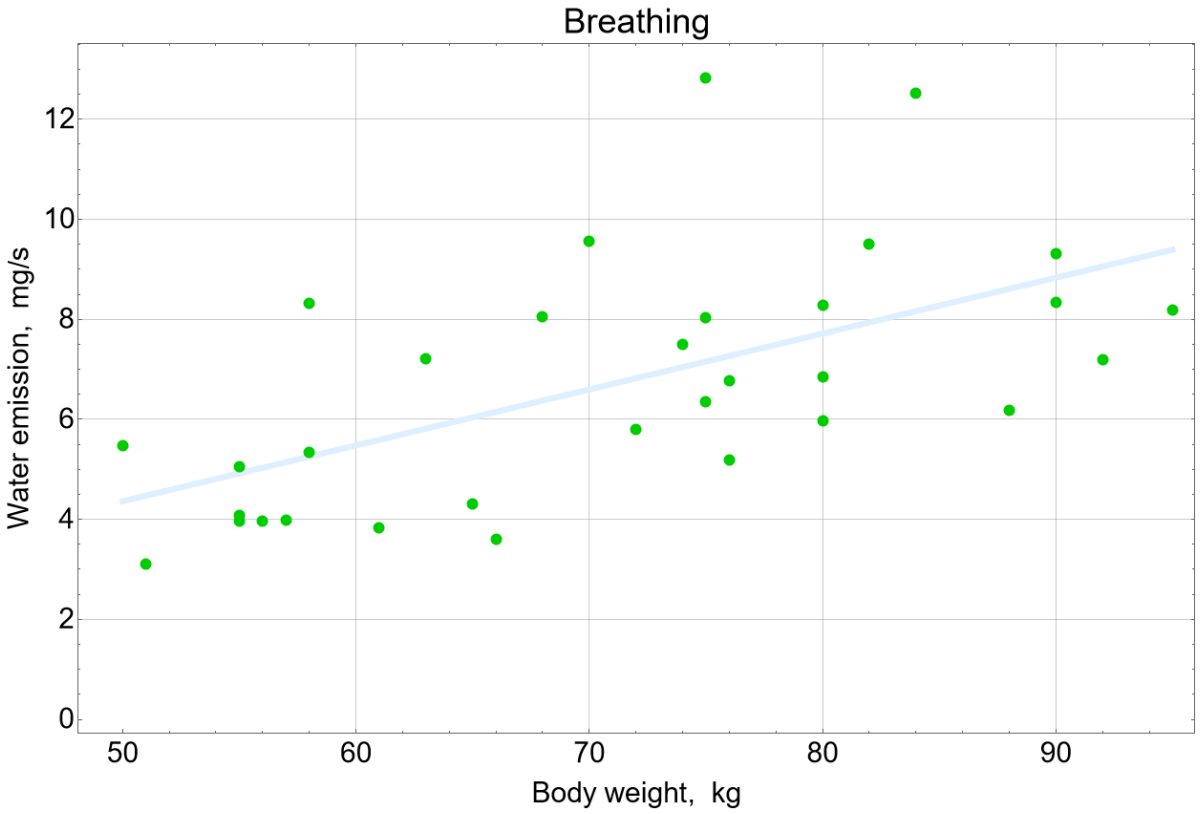
Emission rate = Increase of water content in air / Measurement duration (20 min)

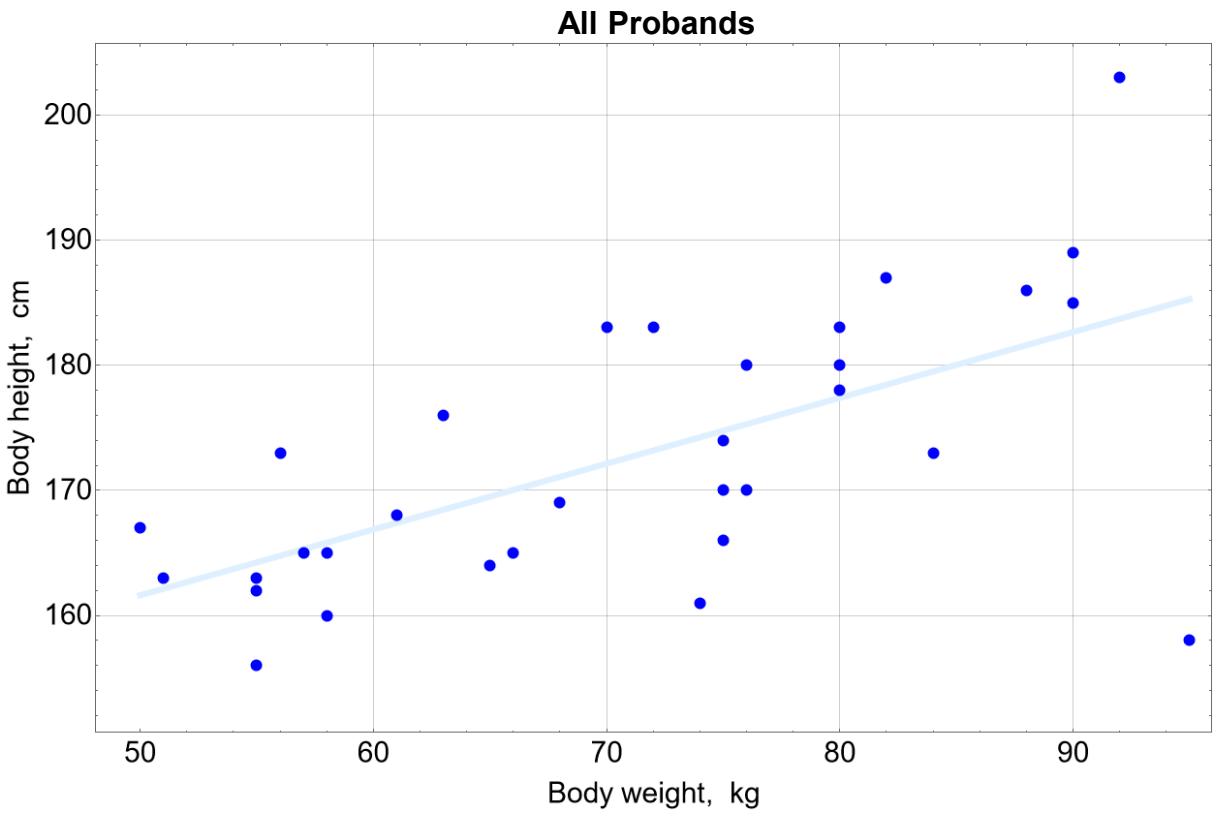


(153 g – 133 g) / 1200 s = 1.0 g/min ≈ 17 mg/s

Water emission rate during silent breathing

Correlation with body weight





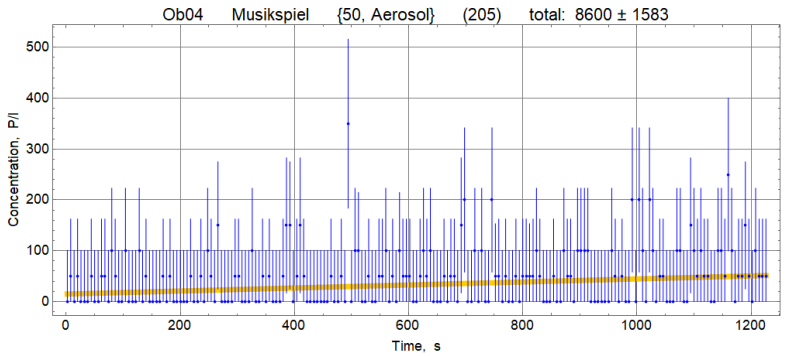
Sequence of single particle measurements (each 6 s)

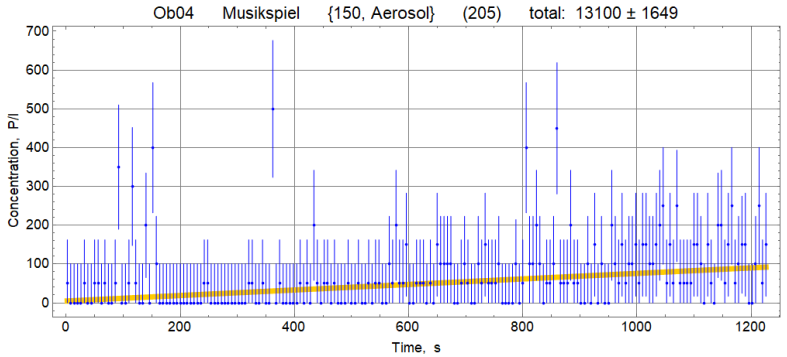
Task: ‘Play’. Size bins: ‘Aerosol’ (≤ 6.6 µm), ‘Droplets’ (> 6.6 µm). 3 spectrometers

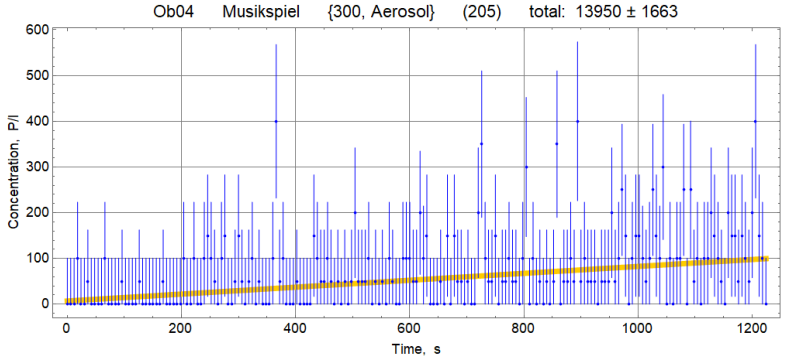
Spectrometer in **50 cm distance**

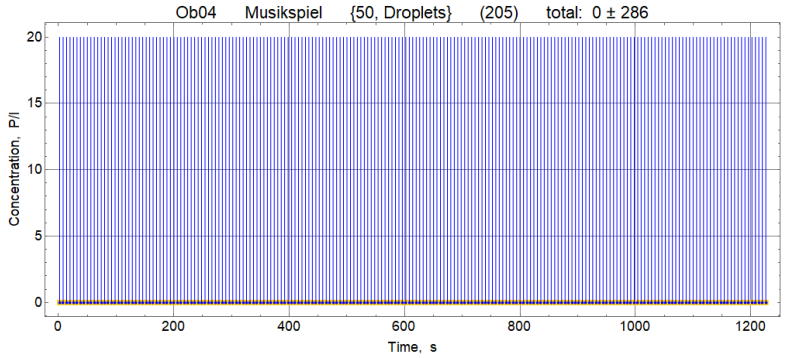
150 cm distance

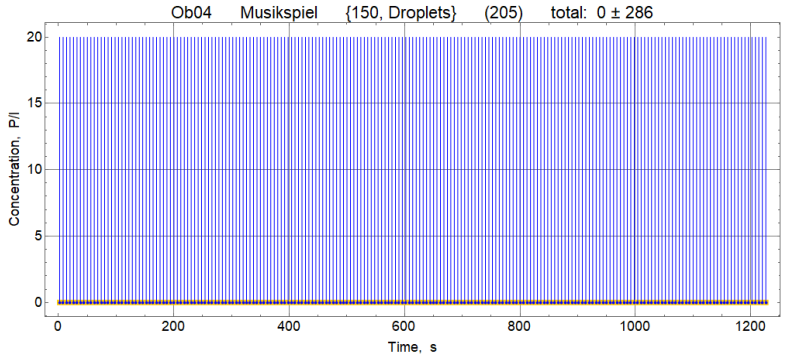
300 cm distance

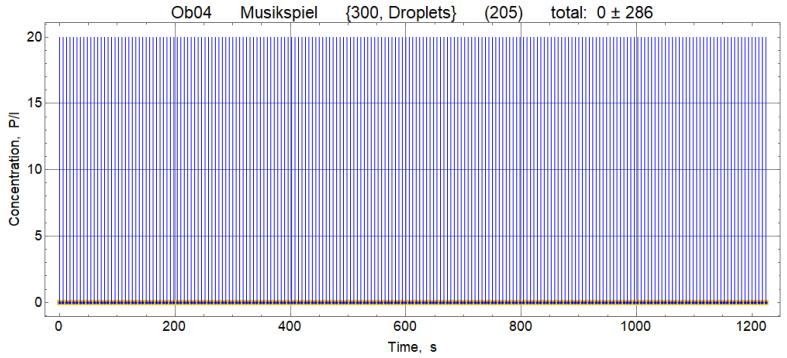








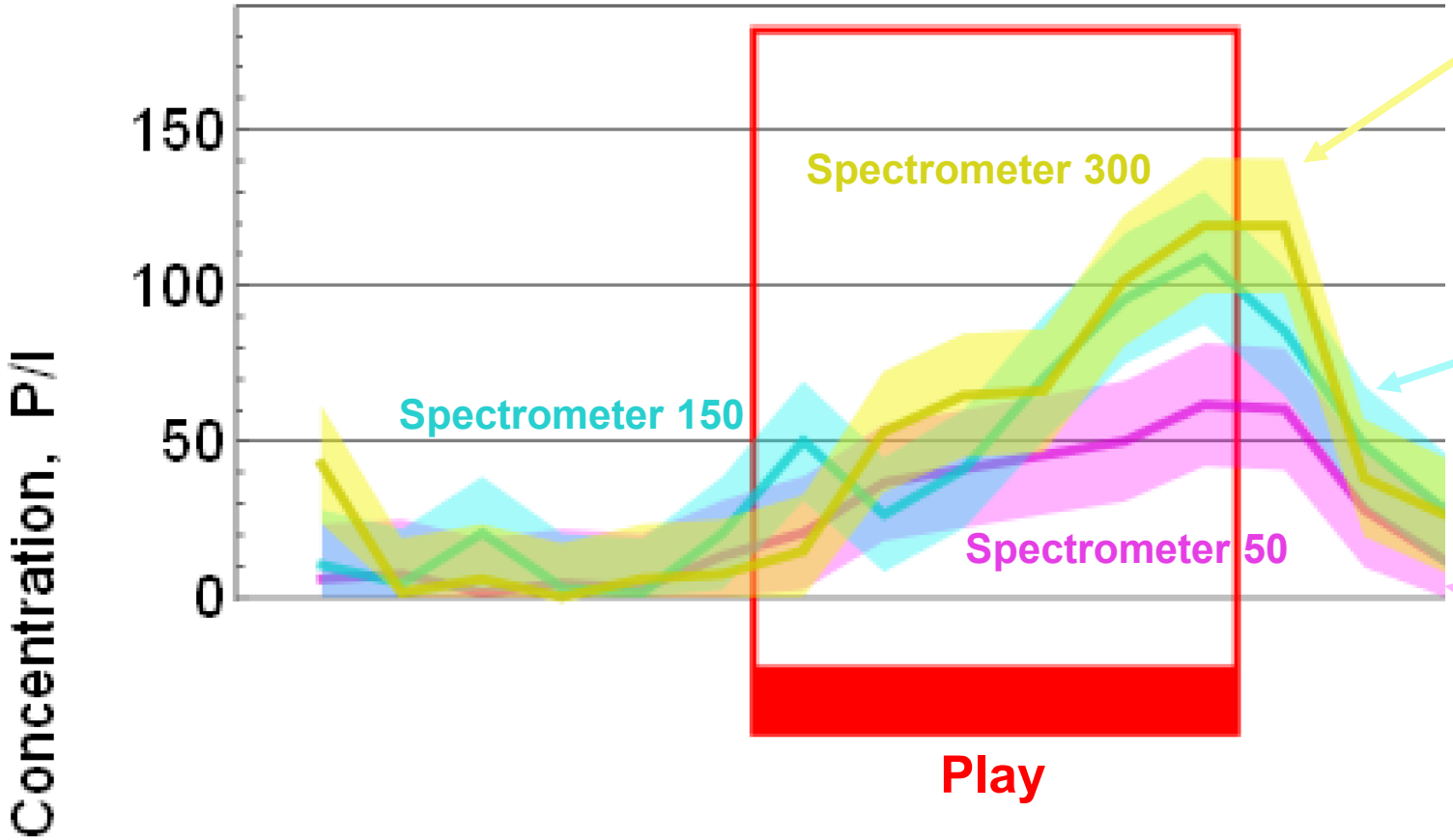


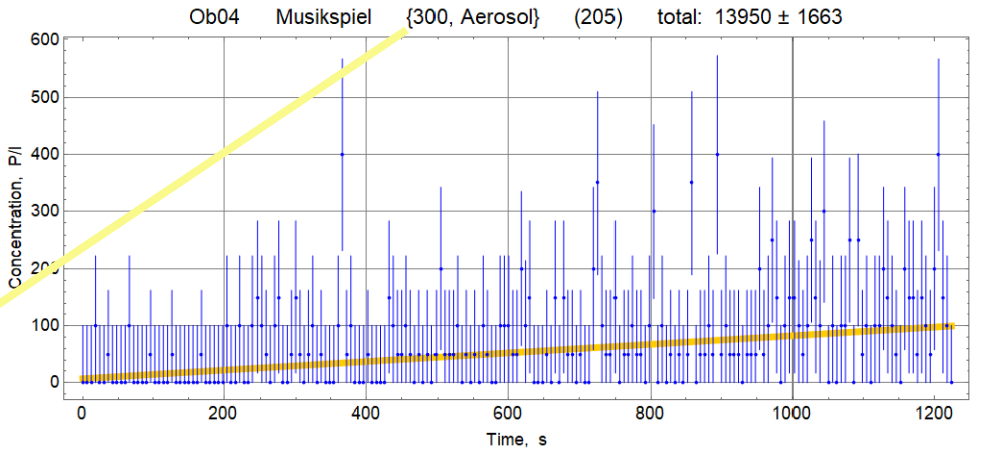


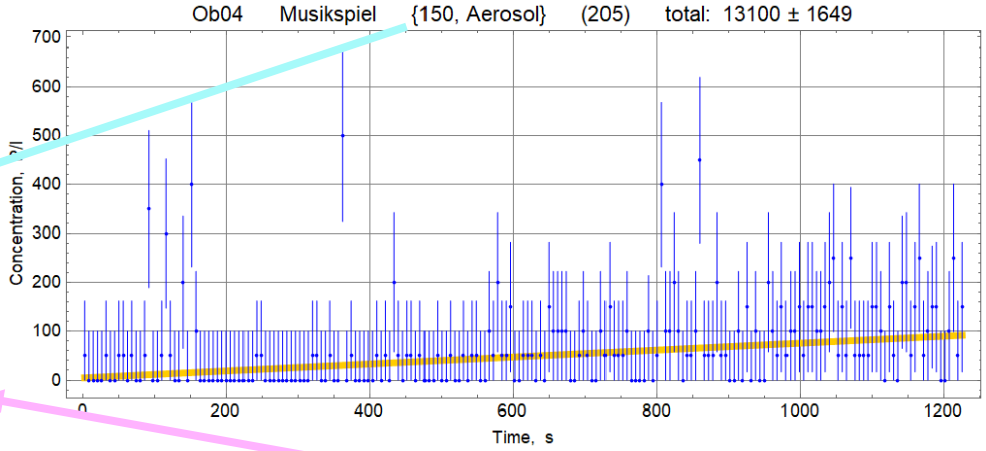
- Error bars indicate estimation uncertainty (±1σ) of particle concentration as resulting from statistical fluctuation during particle counting
- In this example no particle > 6.6 µm has been detected. Hence, the air concentration of ‘droplets’ is likely less than 20 per liter

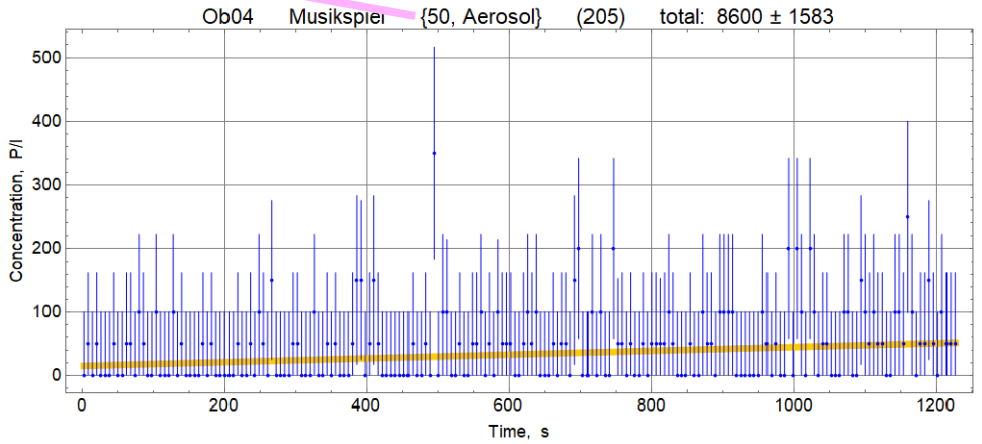
Noise reduction by averaging over 204 s

34 single measurements fused to one concentration value



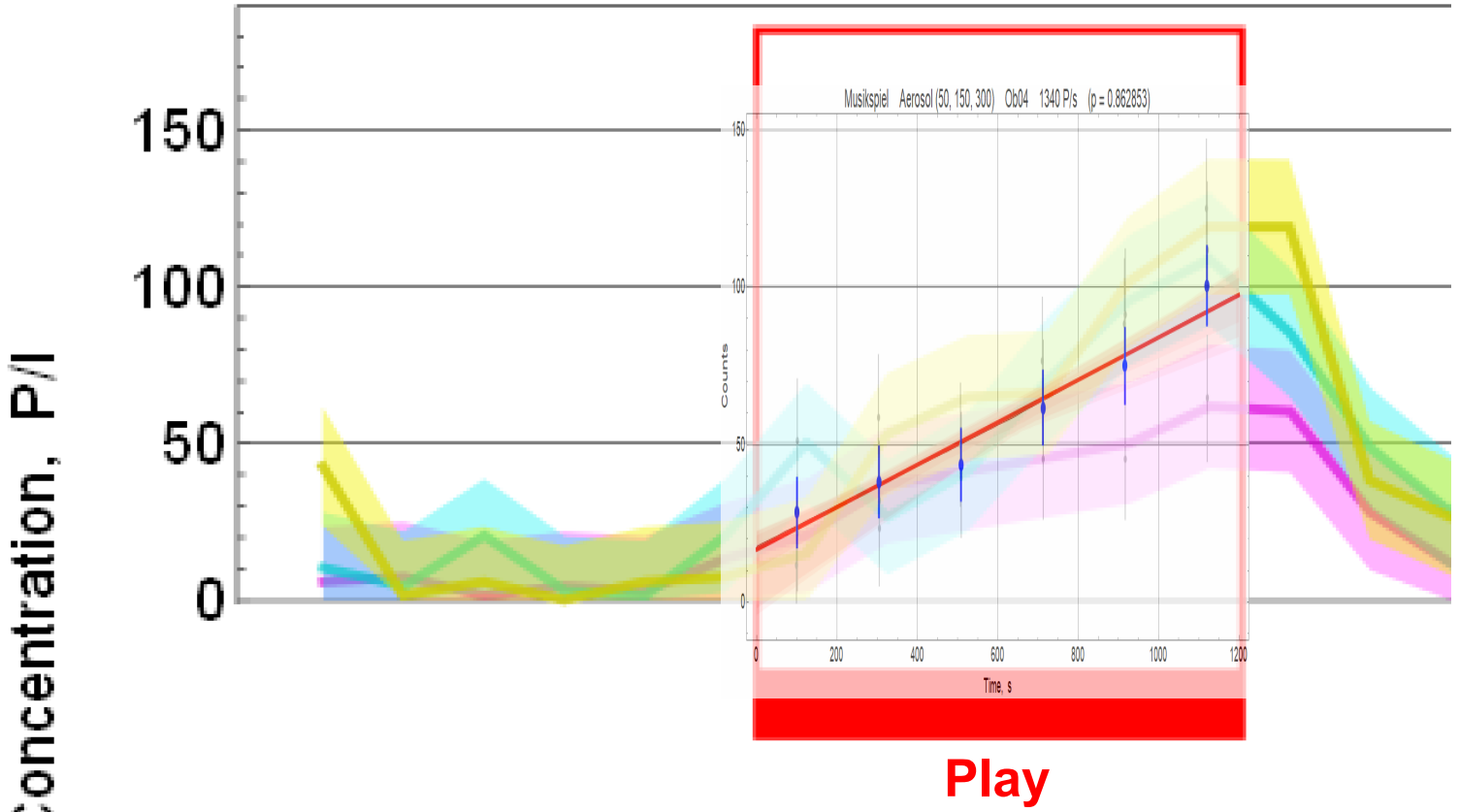


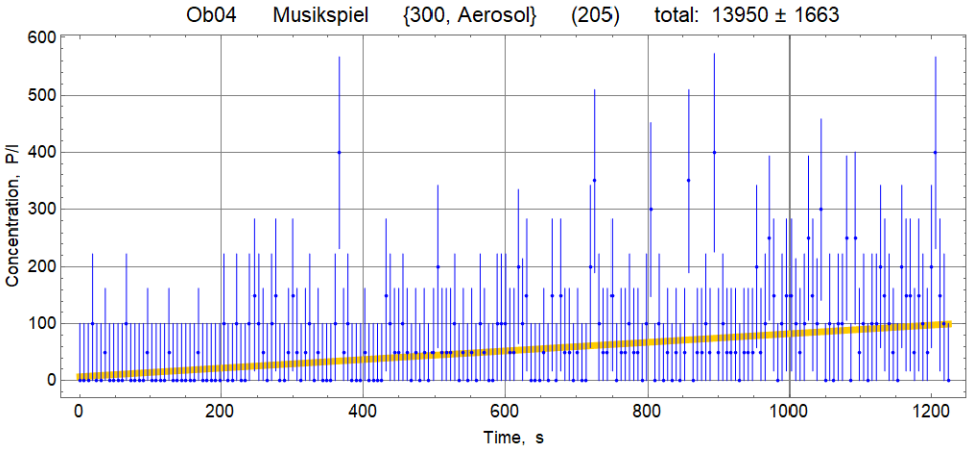


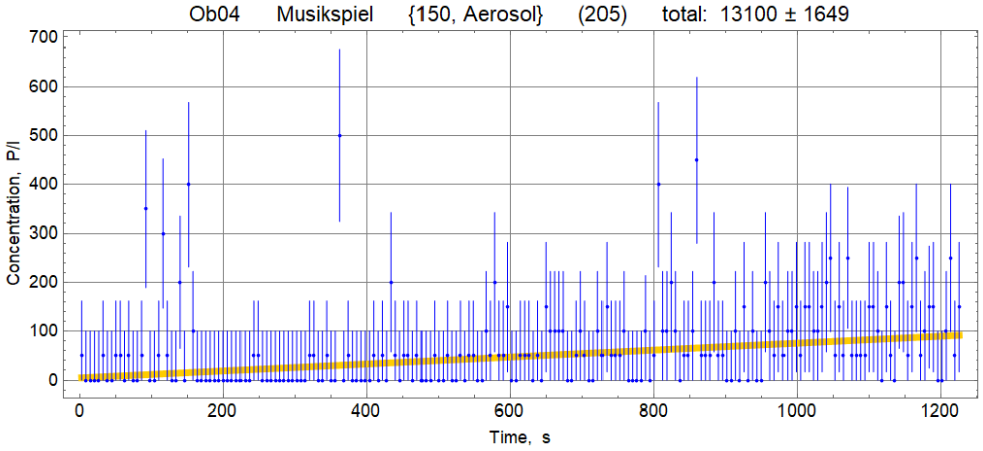


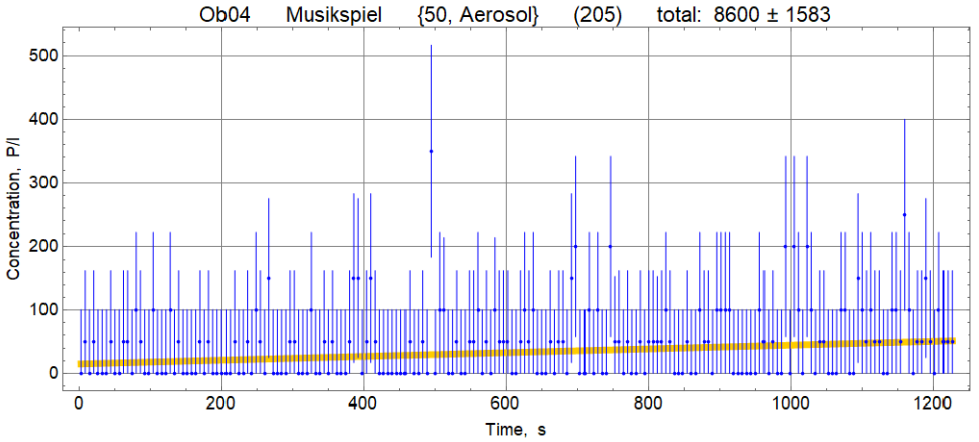
Simultaneous fit of straight line to all 3 transients

Assuming well-mixed air inside cabin and zero air changes



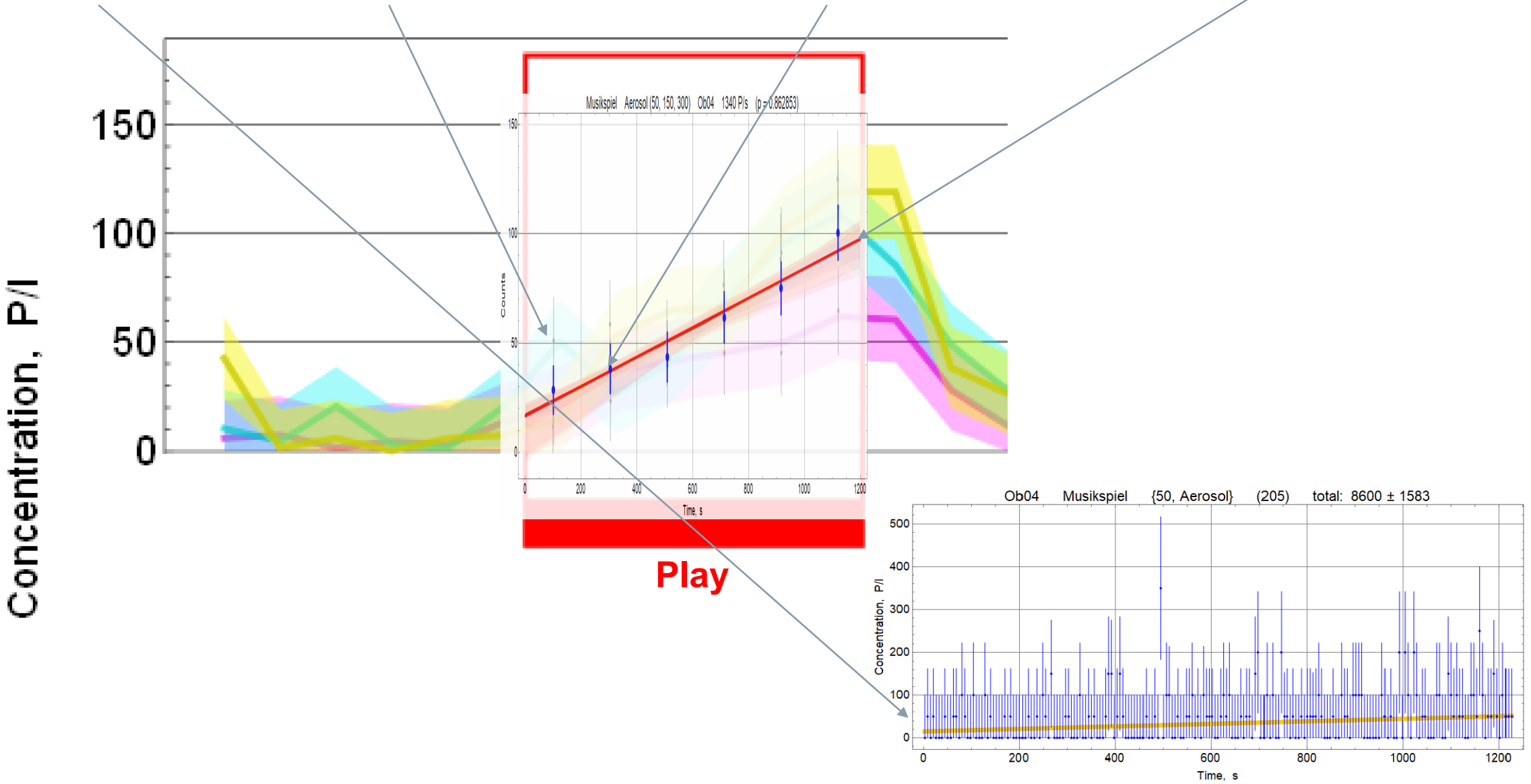






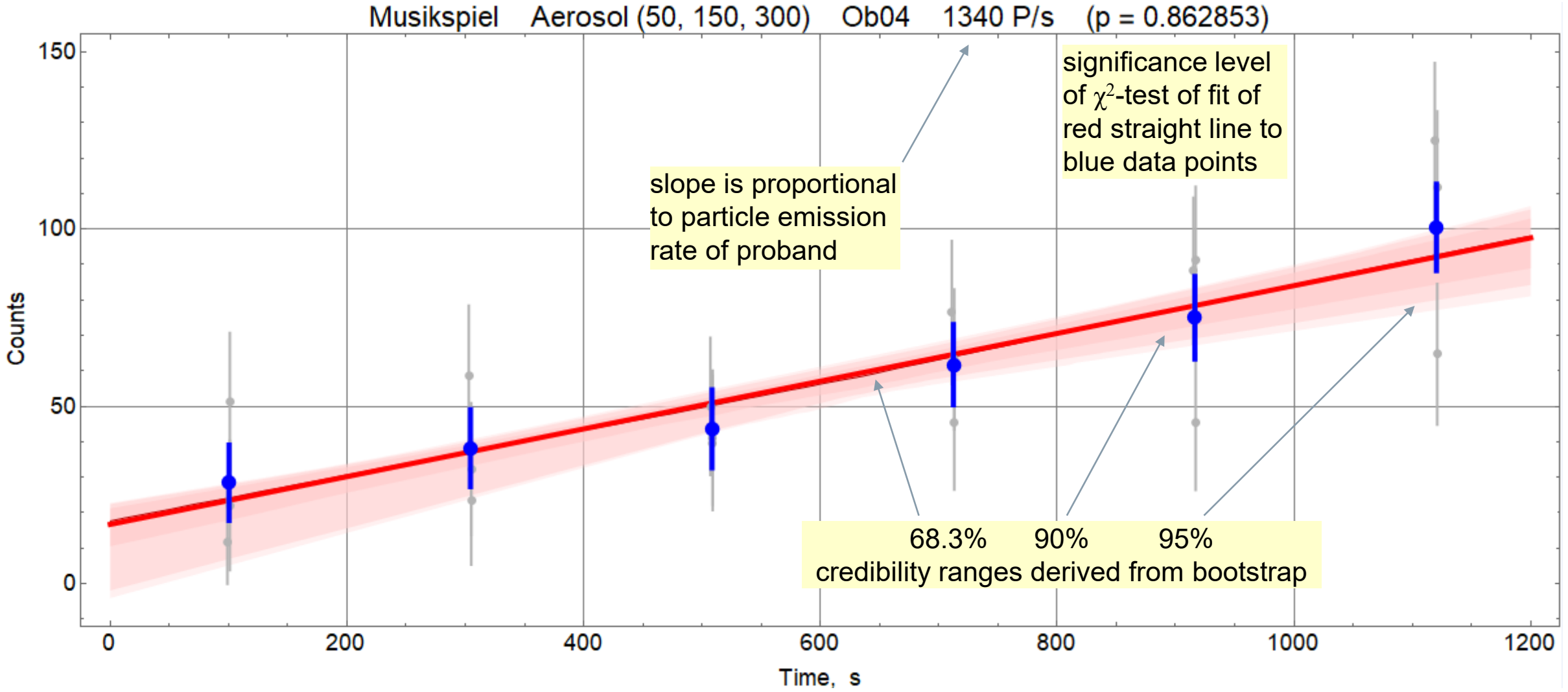
Simultaneous fit of one straight line to all 3 transients (well-mixed air)

1. Original values → 2. Auxiliary: 34 values fused → 3. Aux.: 3 aux. values fused → 4. Line fit



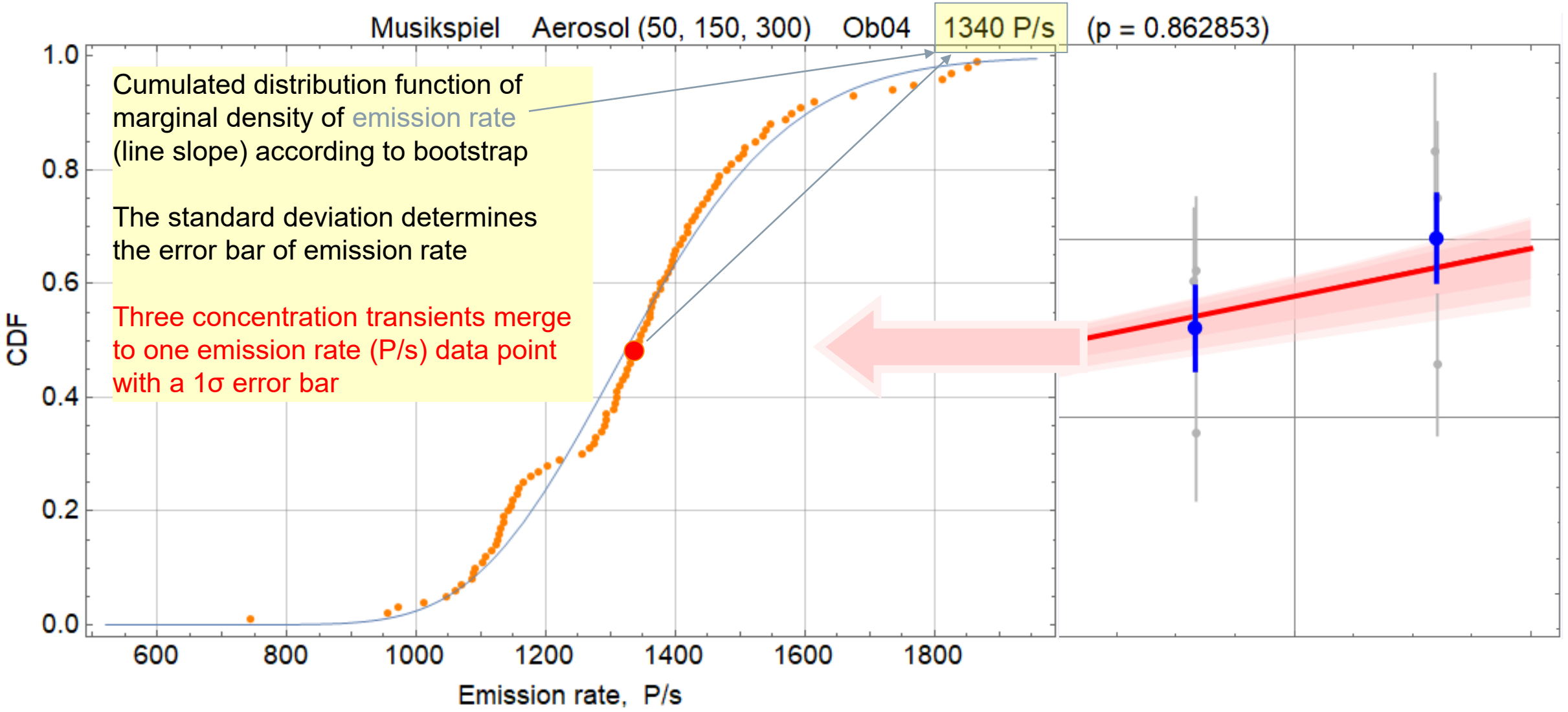
Calculation of particle emission rate

Point estimate and confidence limits of line slope



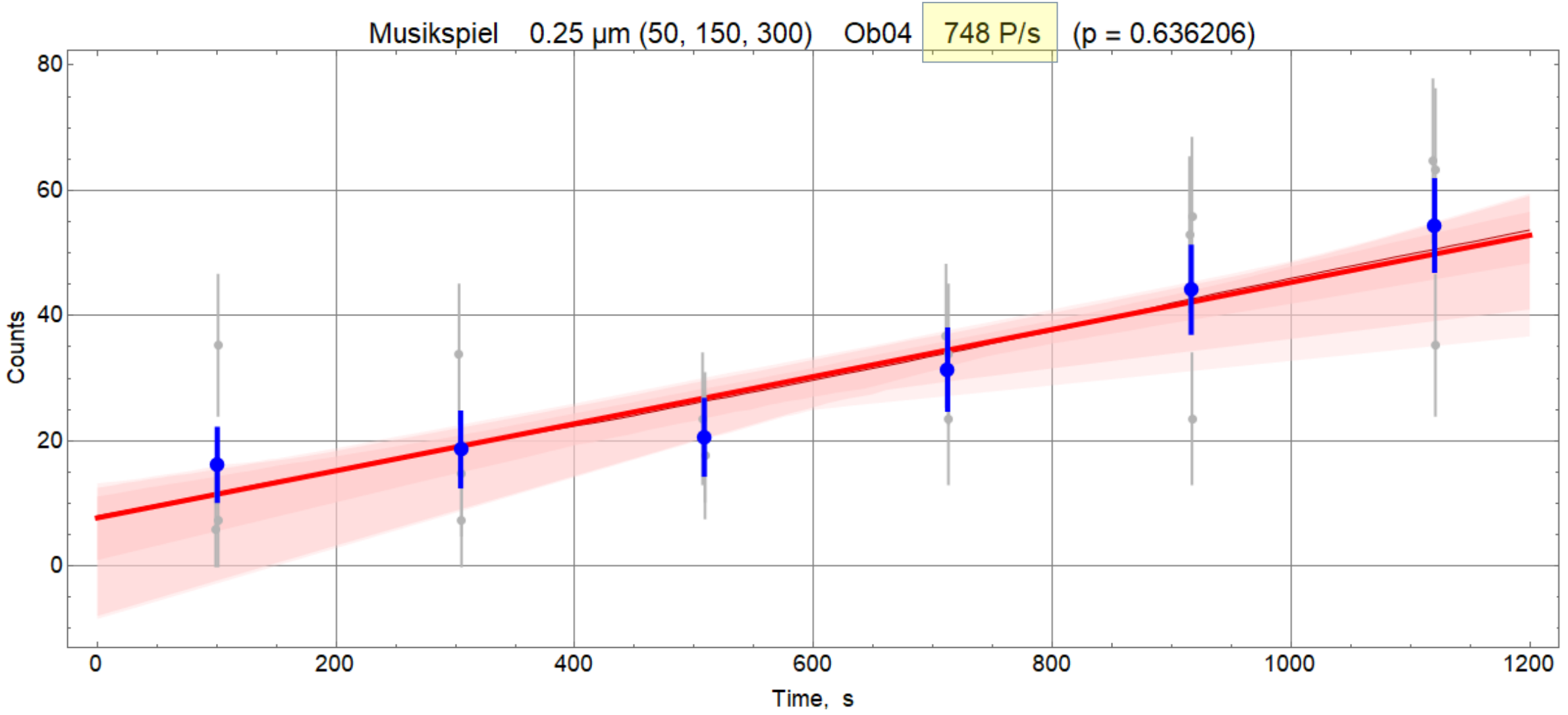
Calculation of particle emission rate

Point estimate and confidence limits of line slope



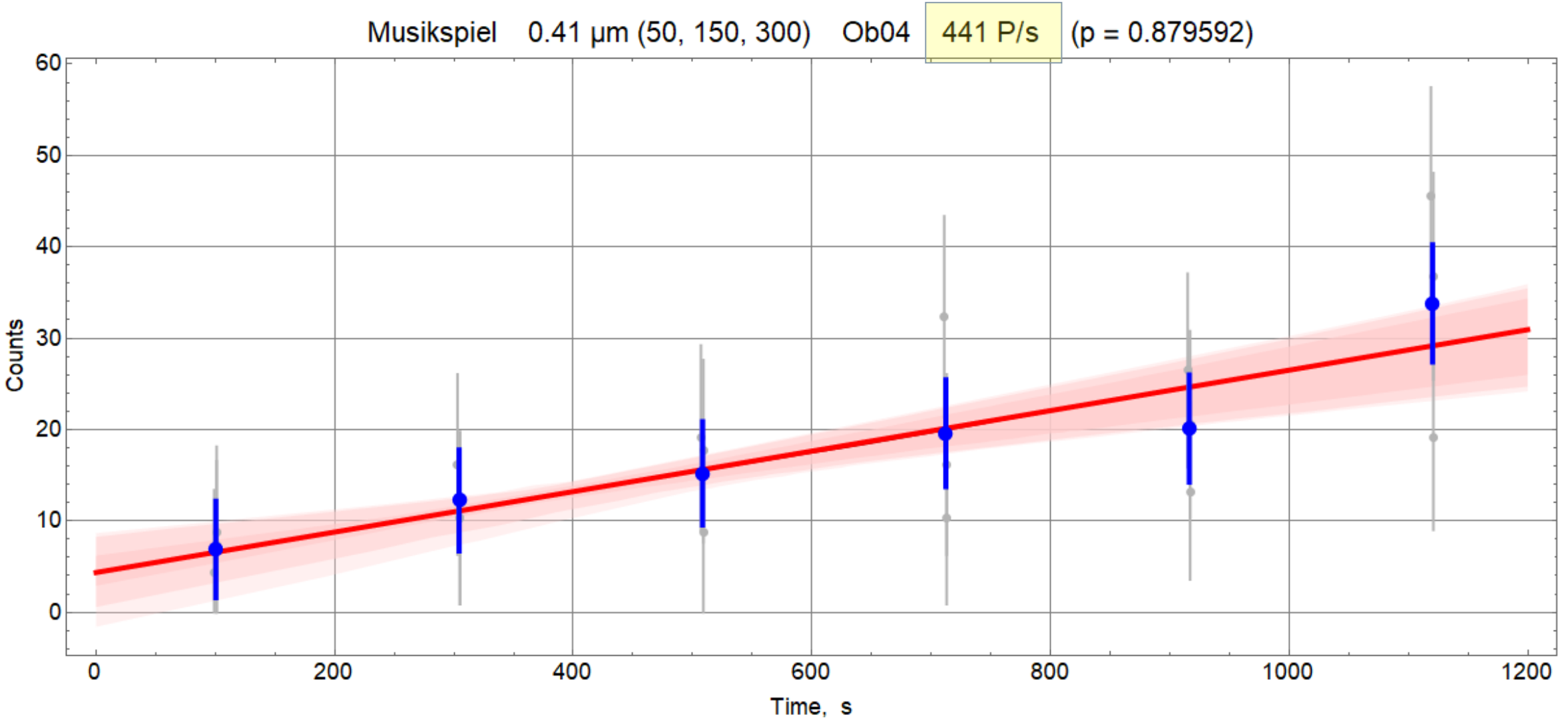
Emission rates for single particle size bins

… together yield an emission histogram



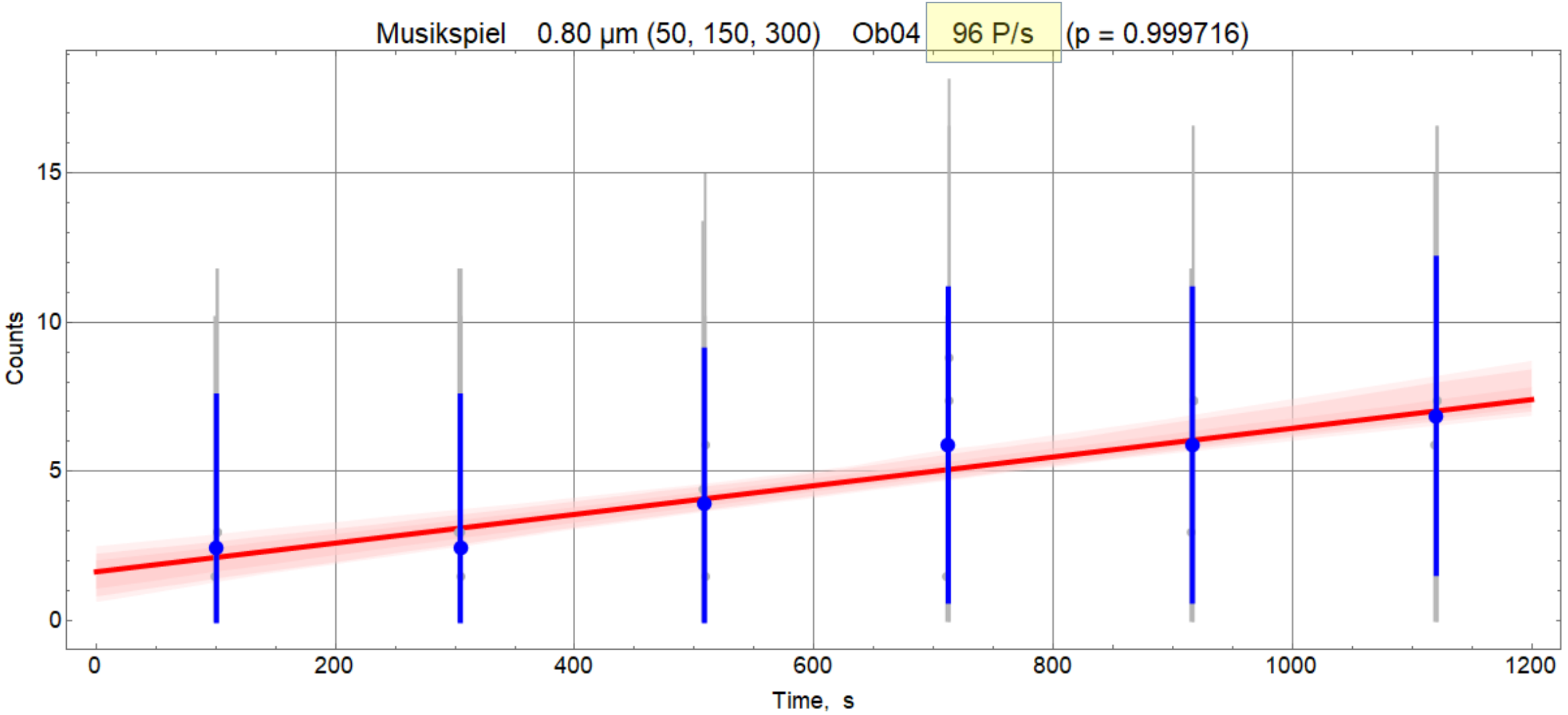
Emission rates for single particle size bins

… together yield an emission histogram



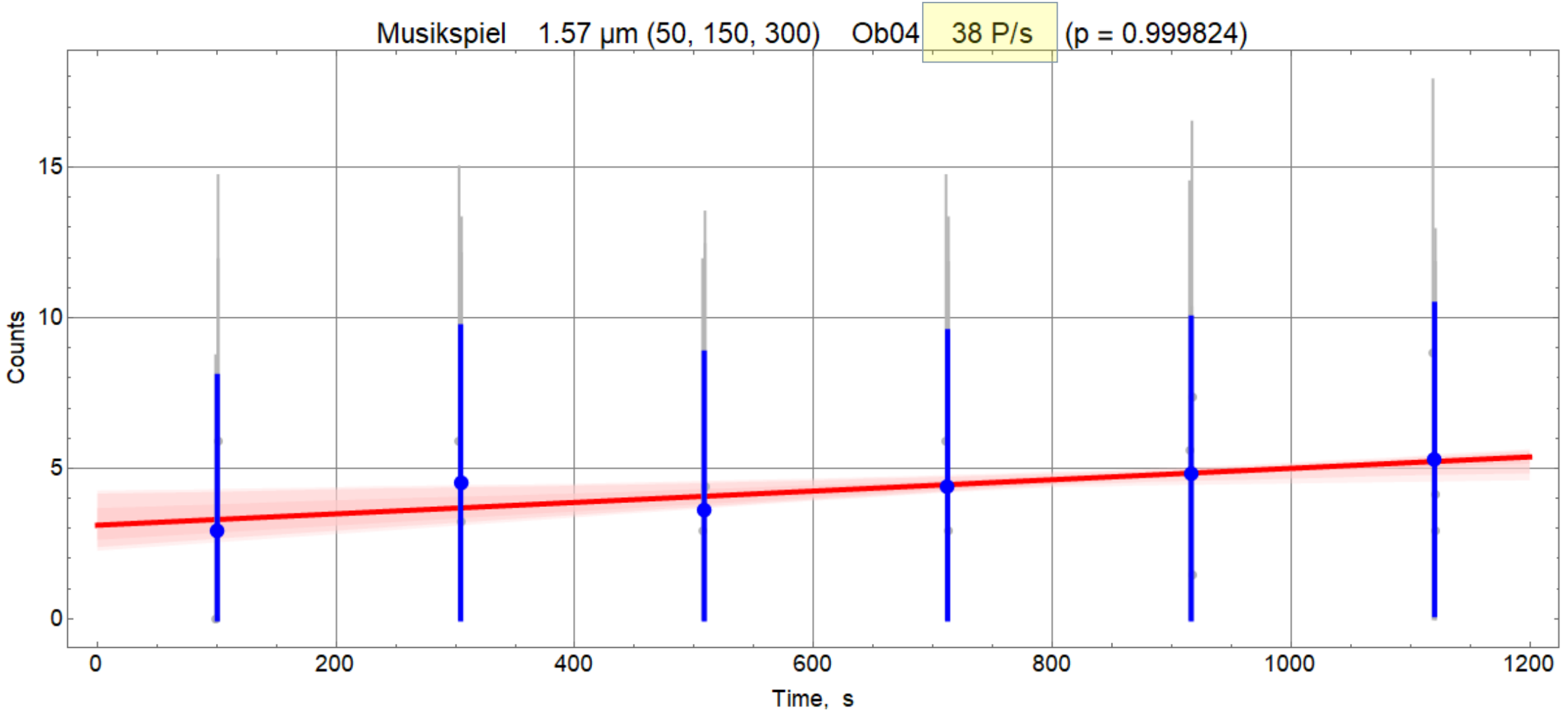
Emission rates for single particle size bins

… together yield an emission histogram



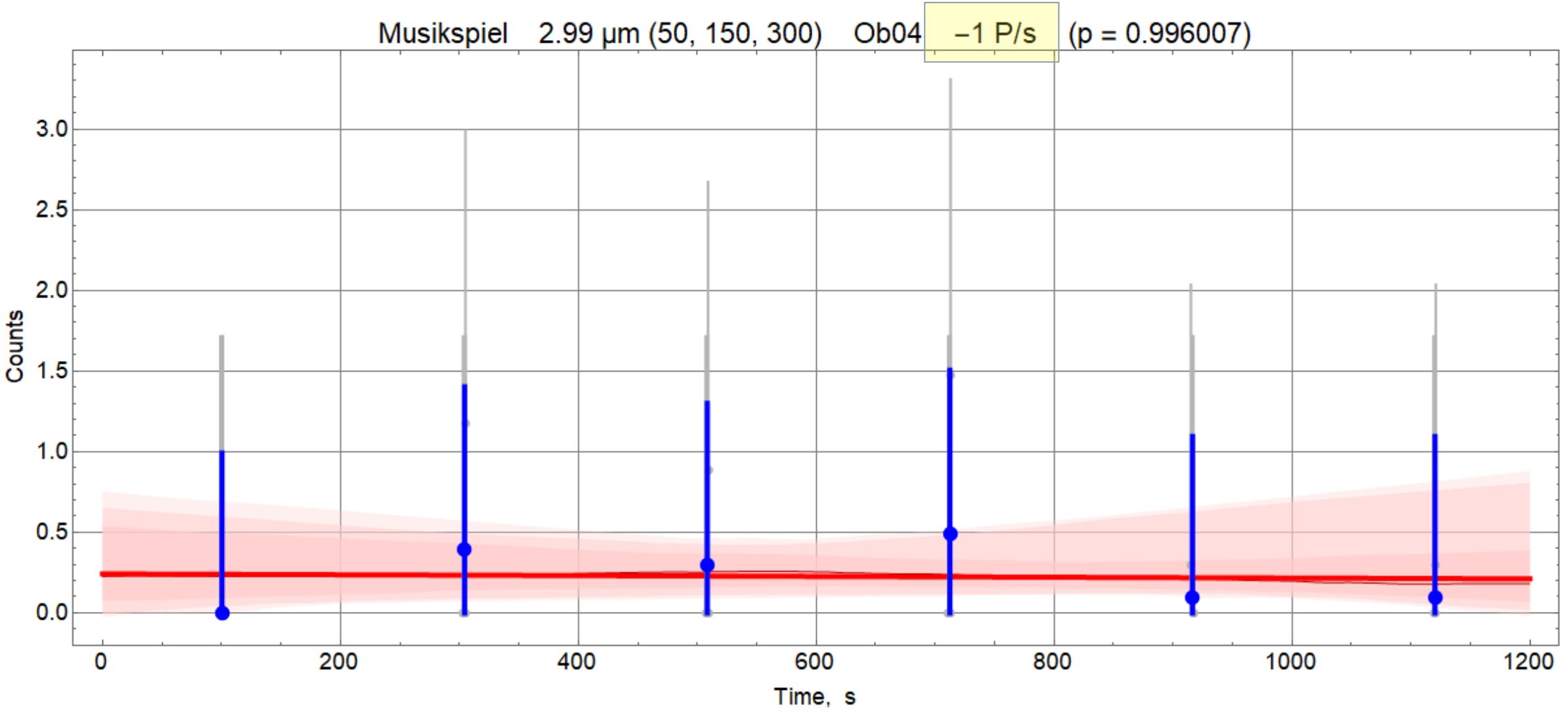
Emission rates for single particle size bins

… together yield an emission histogram



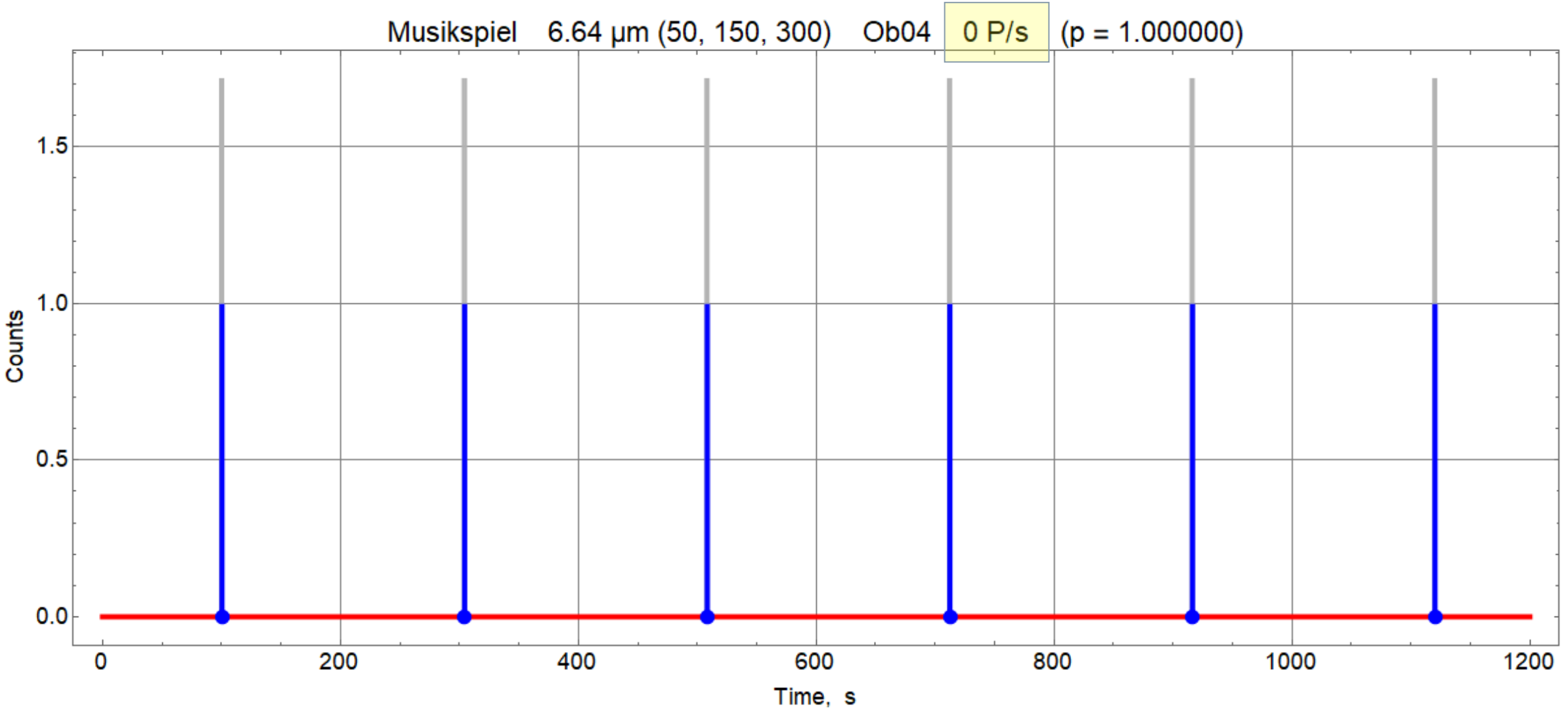
Emission rates for single particle size bins

… together yield an emission histogram



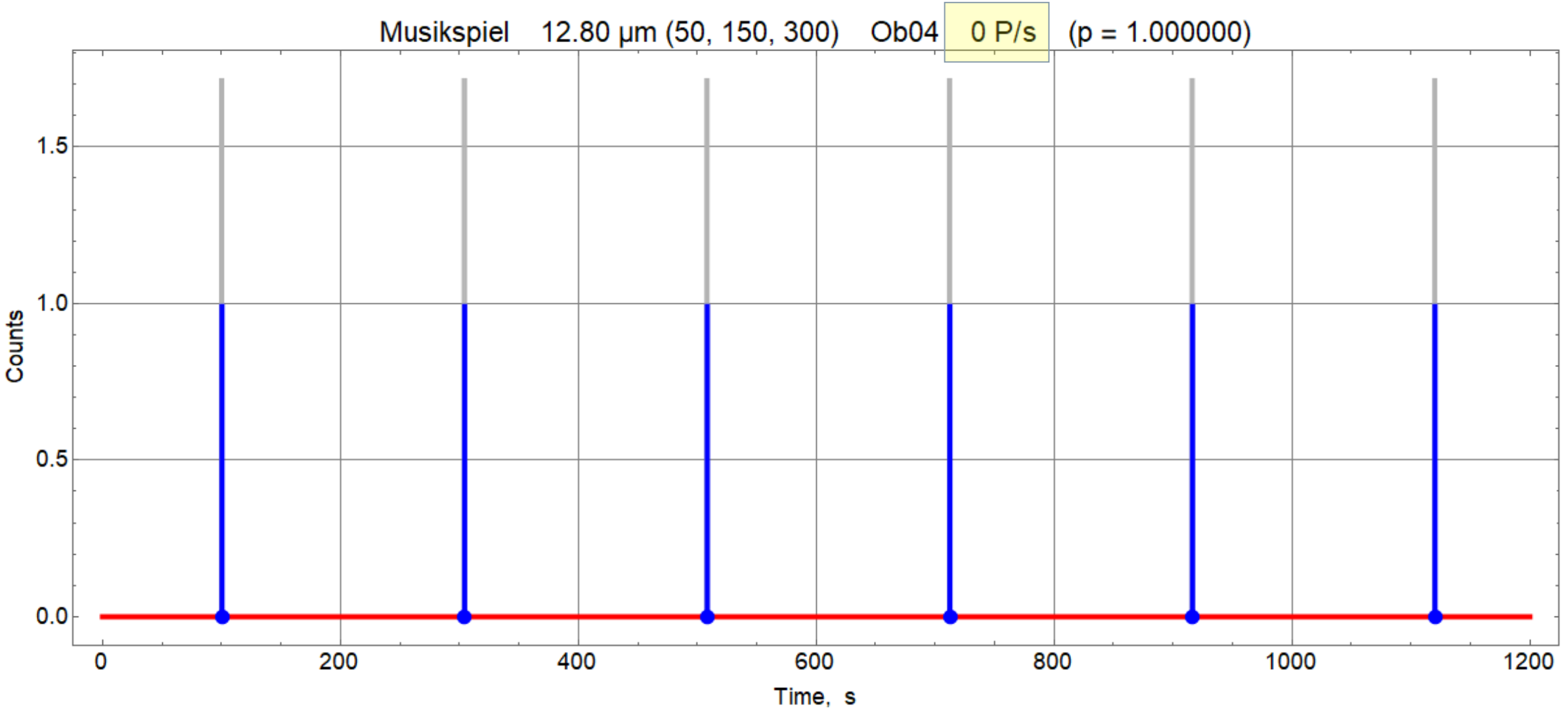
Emission rates for single particle size bins

… together yield an emission histogram



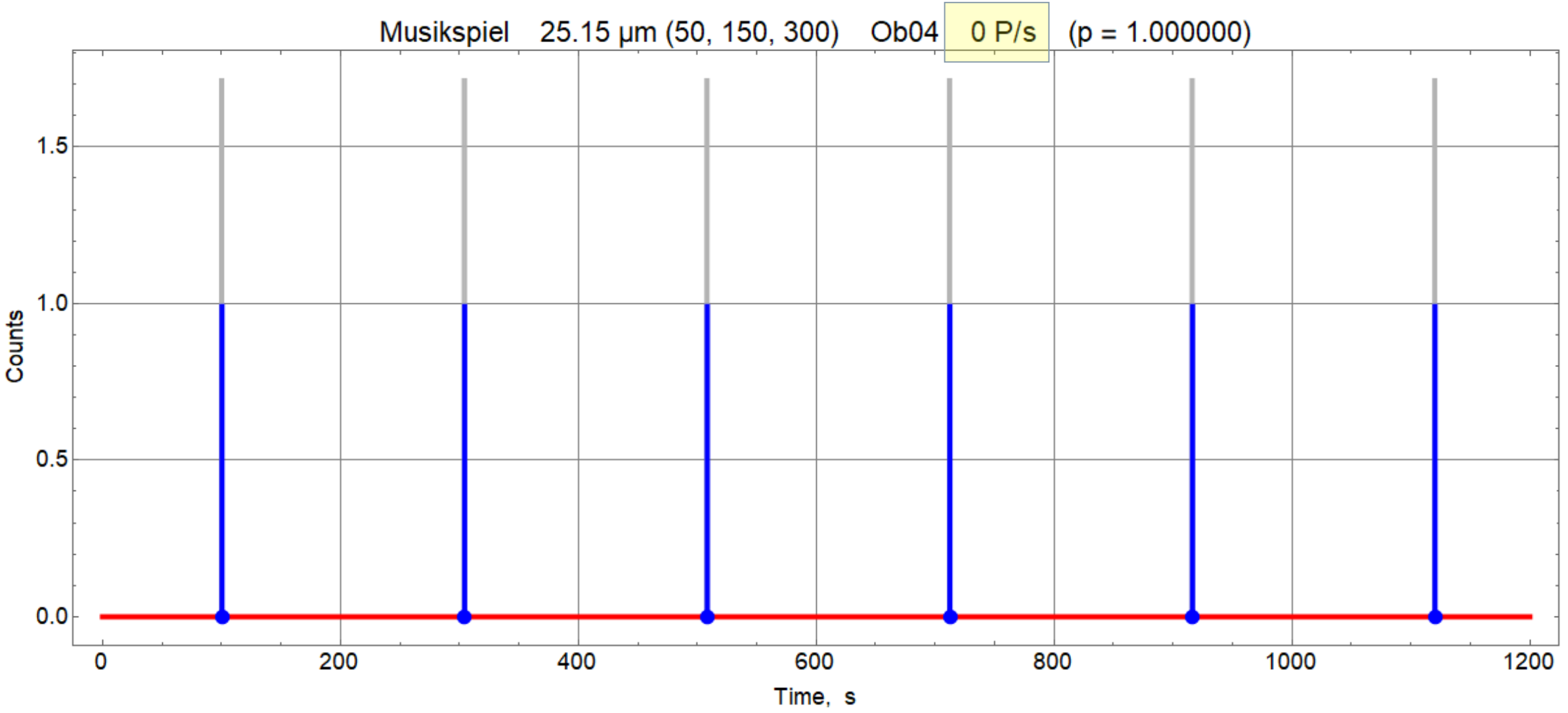
Emission rates for single particle size bins

… together yield an emission histogram



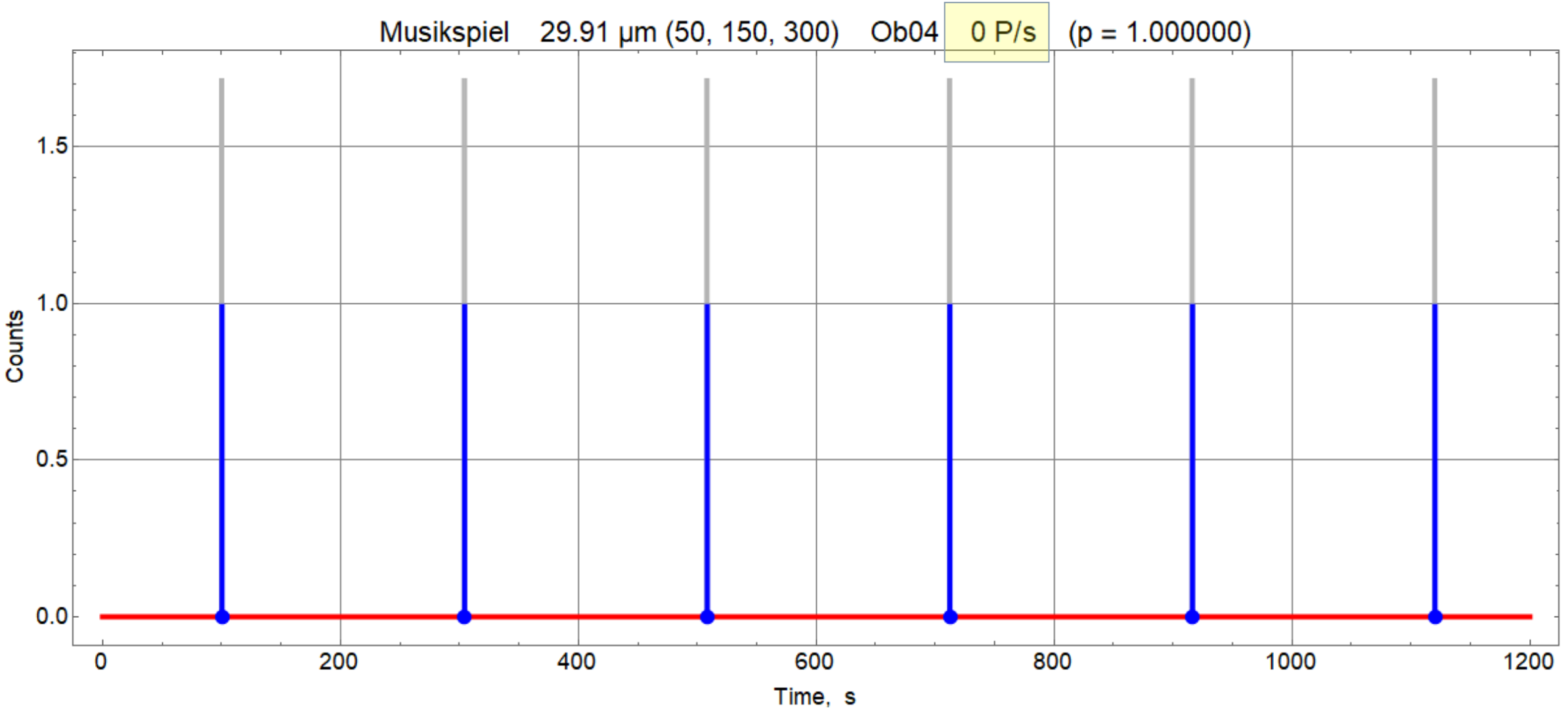
Emission rates for single particle size bins

… together yield an emission histogram



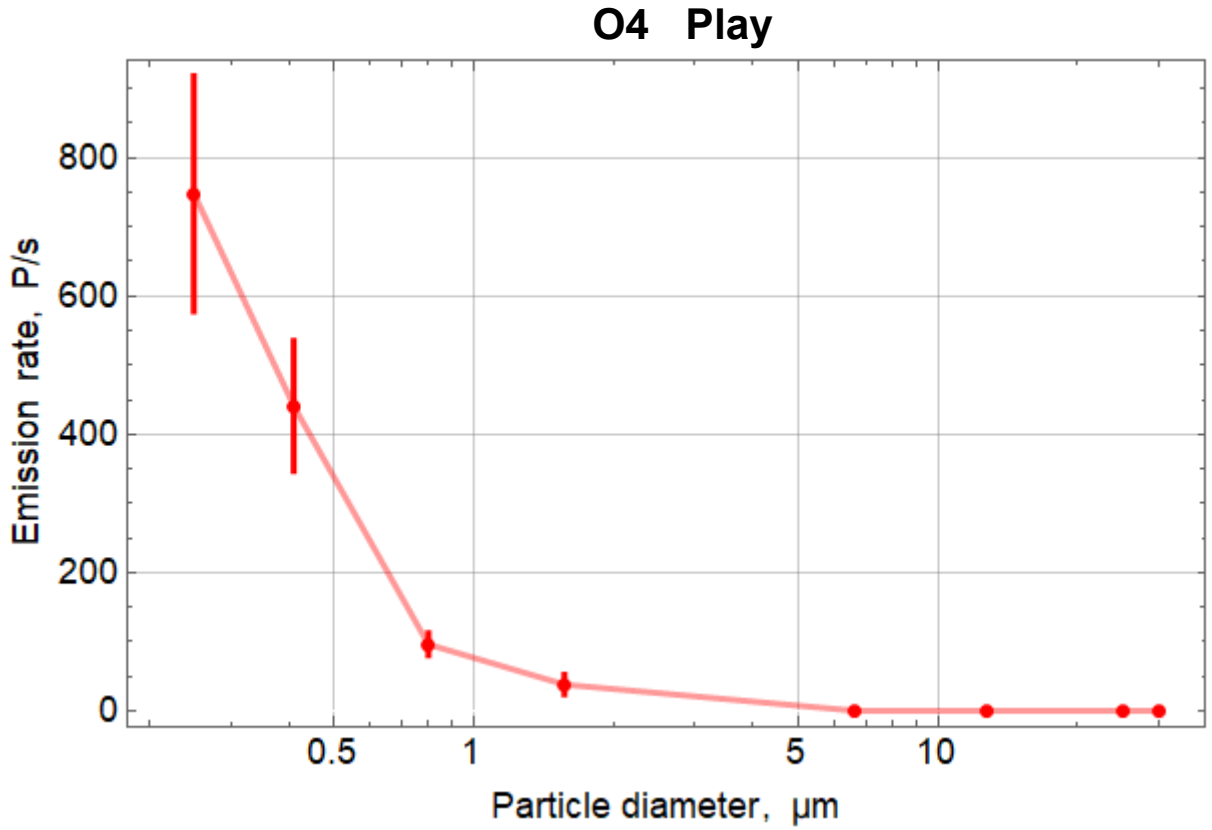
Emission rates for single particle size bins

… together yield an emission histogram



Emission histogram

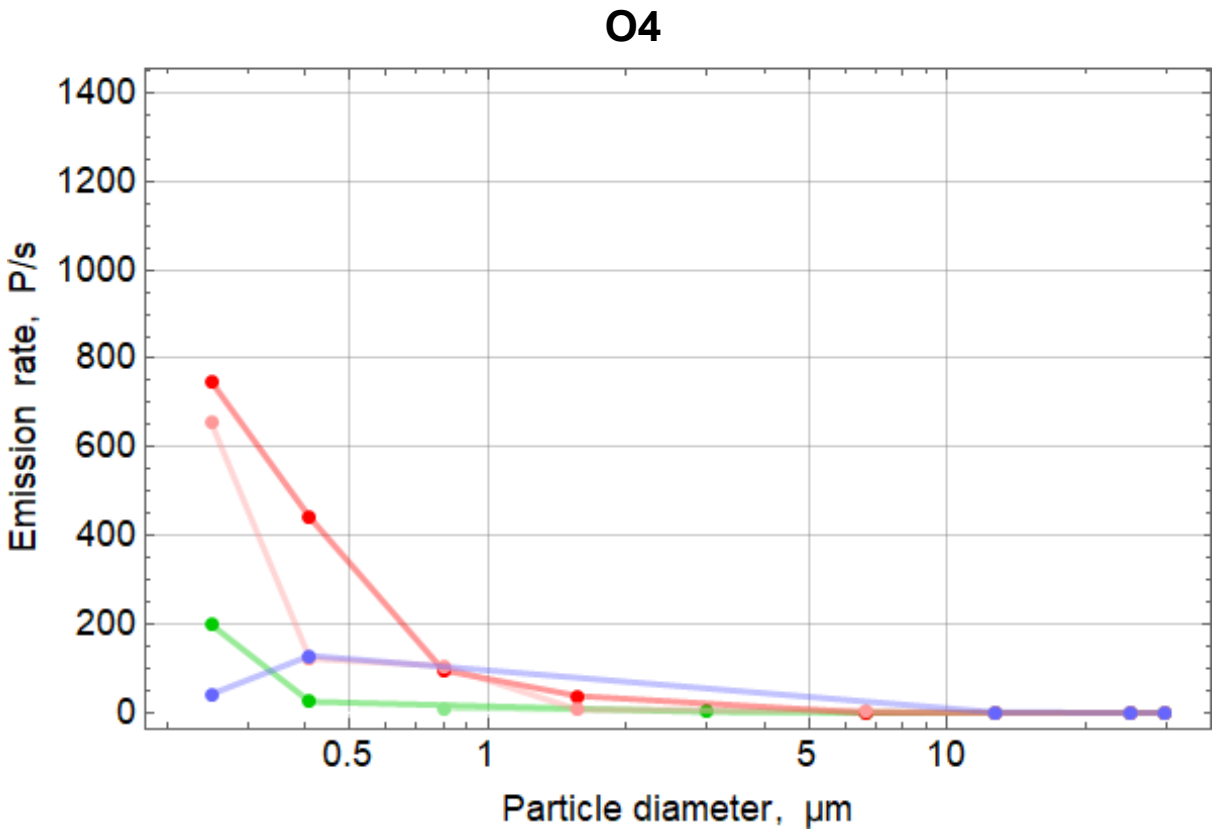
1σ error bars, integral emission rate: 1340 P/s for ‘Aerosol’ (sum over 5 size bins)



Particle diameters are equilibrium diameters resulting after desiccation or hygroscopic growth, respectively

Emission histograms of proband O4 during all tasks

Error bars omitted for better readability



- Play
- Speak
- Breathe
- Play with mask over bell
- Speak with mask