

# Partial Coherence in Undulator Beamlines at Ultra-low Emittance Storage Rings

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The modelling of the radiation through the beamline is essential when dealing with synchrotron beamlines. Incoherent radiation from synchrotron can be analyzed using methods such as Monte Carlo ray tracing. Coherent radiation is analyzed by physical optics. None of these methodologies can be directly applied to partial coherence without some approximations. We introduced a new exact numerical method based on its decomposition in coherent modes for fully calculating the cross spectral density of the synchrotron radiation[1]. All parameters of the beam can be calculated from the numeric decomposition using COMSYL[2]. Moreover, the spectrum of the modes along the beamline gives additional precious information, as it is a direct measure of how much coherence has the beam. Coherent fraction becomes a natural measure of the amount of coherence in the beam. Some examples of simulations for the EBS (Extreme Brilliant Source) under construction at ESRF are shown.

## References

[1] Glass, M. & Sanchez del Rio, M (2017) EPL 119 34004

[2] [github.com/mark-glass/comsyl](https://github.com/mark-glass/comsyl)