



Contribution ID: 57

Type: **Regular Talk**

## Optimized chaos properties from a laser diode subjected to phase conjugate feedback

*Thursday, 8 September 2022 15:50 (25 minutes)*

We analyze in details experimental measurements of chaos generated by a laser diode subjected to phase-conjugate feedback realized using a SPS photorefractive crystal in a CAT configuration. In addition to the typical figure of merit, ie, chaos bandwidth, the corresponding spectral flatness and permutation entropy at delay is analyzed. The experiments reveal that chaos, with a bandwidth up to 30 GHz, a spectral flatness up to 0.75, and a permutation entropy at delay of up to 0.99 can be generated. These optimized performances are observed over a large range of parameters and have not been achieved in the conventional optical feedback configuration. Interestingly, when the pump current is reduced, the chaos bandwidth is also reduced while keeping the spectral flatness and the permutation entropy. Our experimental findings are in qualitative agreement with the presented numerical simulations produced using the Lang-Kobayashi model.

References:

- [1] G. Bouchez et al., Physical Review E 103, 042207 (2021).
- [2] G. Bouchez et al., Optics letters 44 (4), 975-978 (2019)

**Primary author:** Dr BOUCHEZ, Guillaume

**Co-authors:** Dr MALIKA, Tushar; Prof. SCIAMANNA, Marc

**Presenter:** WOLFERSBERGER, Delphine (CentraleSupélec/LMOPS/Chair in Photonics)

**Session Classification:** Optical analogues of complex phenomena

**Track Classification:** Optical analogues of complex phenomena: quantum systems, general relativity, chaos