TFNP consists of total search problems for which the correctness of an answer can be efficiently verified. Since it is unlikely to have a complete problem, the main research direction is the study of subclasses of TFNP, defined by reducibility to various search problems within TFNP. Among these classes, the five most well-known are the 'classical' ones: PPP, PPA, PLS, PPAD, and PPADS. A natural question is: what are the relationships between these classes? Since unconditional separations between any two of them would imply P $\neq$ NP, separations are made in a black-box model. A year ago, a complete picture of inclusions and separations between these classes (and even their intersections) was established [HKT24; LPR24]. An interesting continuation of this work is to attempt strengthening those separations to separations relative to randomized reductions. For some pairs of classes, this has already been achieved.

In this talk, we will show that for some classes, in a black-box model, randomized reductions from them to any problem in TFNP can be derandomized. In particular, this applies to all the above-mentioned classes except PLS.

This talk does not require the listener to have any knowledge beyond basic computational complexity. All necessary definitions will be provided.

References

[HKT24] Pavel Hubáček, Erfan Khaniki, and Neil Thapen. "TFNP Intersections Through the Lens of Feasible Disjunction". In: *15th Innovations in Theoretical Computer Science Conference (ITCS 2024)*. Ed. by Venkatesan Guruswami. Vol. 287. Leibniz International Proceedings in Informatics (LIPIcs). Dagstuhl, Germany: Schloss Dagstuhl – Leibniz-Zentrum für Informatik, 2024, 63:1–63:24. ISBN: 978-3-95977-309-6. DOI: 10.4230/LIPIcs.ITCS.2024.63. URL: https://drops.dagstuhl.de/entities/document/10.4230/LIPIcs.ITCS.2024.63.

[LPR24] Yuhao Li, William Pires, and Robert Robere. "Intersection Classes in TFNP and Proof Complexity". In: *15th Innovations in Theoretical Computer Science Conference (ITCS 2024)*. Ed. by Venkatesan Guruswami. Vol. 287. Leibniz International Proceedings in Informatics (LIPIcs). Dagstuhl, Germany: Schloss Dagstuhl – Leibniz-Zentrum für Informatik, 2024, 74:1–74:22. ISBN: 978-3-95977-309-6. DOI: 10.4230/LIPIcs.ITCS.2024.74. URL: https://drops.dagstuhl.de/entities/document/10.4230/LIPIcs.ITCS.2024.74.