Junior Trimester Program "Stochastic modelling in the life science: From evolution to medicine"

Group: Herpesvirus dormancy

Members: Felix Hermann, Adrian Gonzalez Casanova, Lizbeth Peñaloza Velasco, Airam Blancas, Anna Kraut, Alice Callegaro, Raphael Eichhorn, Alejandro Hernández Wences

The junior Trimester Program provided us a stimulating work environment and plenty opportunities to initiate scientific discussions and collaborations. Many thanks to HIM administration for their constant support.

Our group organised the workshop "Impacts of dormancy and latency on host parasite dynamics" (May 16-20, 2022). The aim of this workshop was to bring together mathematicians and biologists whose research concerns dormancy. Two cross language barriers between the two disciplines the workshop consisted of a school part during the forenoon with longer introductory lectures and a workshop part during the afternoon with scientific talks about topical research. We enjoyed the talks and the lively discussions during the workshop.

Furthermore, one of our guests Arno Siri-Jégousse gave a great Trimester Seminar Series on "Exchangeable coalescents, theory and application" (July 11- 14).

Besides this HIM gave us the possibility to invite researchers to HIM. Our group invited the following scientists:

- Sandra Palau (19.06.2022 – 16.07.2022(
- Arno Siri-Jégousse (04.07.2022 – 14.07.2022)
- Vianney Brouard (10.07.2022 – 30.07.2022)
- Irene Görzer, Michael McVoy (12.07.2022 – 13.07.2022)
- Viktor Bezborodov (07.08.2022 – 11.08.2022), Tyll Krüger (15.08.2022 – 20.08.2022), Piotr Szymanski (06.08.2022 – 12.08.2022), Aurélien Velleret (07.08.2022 – 11.08.2022)

Scientific highlights:

- Airam Blancas, Adrian Gonzalez Casanova and Sandra Palau worked together on a project that investigates the absorption and stationary times for the Λ-Wright-Fisher process, see arXiv:2308.09218 for a preprint (together with Sebastian Hummel).
- Felix Hermann worked with Jochen Blath on the paper "The Contact Process with Switching", for which a preprint (with Michel Reitmeier) is available on arXiv:2205.07275
- Cornelia Pokalyuk worked with Vianney Brouard on the manuscript "Invasion of parasites in moderately structured host populations", which has been published in Stoch. Proc. Appl.
- Cornelia Pokalyuk initiated with Vianney Brouard a project on "Spatial Invasion of Cooperative Parasites", for which a preprint (with Marko Seiler and Hung Tran) is available under arXiv:2308.07397.

- Alejandro Wences worked with Arno Siri-Jégousse on the project "Exchangeable coalescents beyond the Cannings class", for which a preprint is available on arXiv.2212.02154.

Furthermore during the summer school several ongoing projects were initiated or continued, for which preprints should become soon available:

- Raphael Eichhorn and Cornelia Pokalyuk worked on a project with Irene Görzer investigating diversity patterns of the Human cytomegalovirus (HCMV) population. Raphael Eichhorn showed a poster on this project at the International Herpesvirus Workshop in Missoula.
- Raphael Eichhorn and Cornelia Pokalyuk worked with Irene Görzer and Michael McVoy on a project concerning within family and within daycare HCMV population diversity and adaptation. Michael Mc Voy just submitted an abstract on a first data analysis for the 3rd Congress on Congenital Cytomegalovirus in Naples.
- Felix Hermann and Adrián González Casanova worked together with András Tobias and Anton Wakolbinger on a project on clonal interference.
- Lizbeth Penaloza and Alejandro Wences worked with Arno Siri Jégousse on a project on "Density and moments of the TMRCA of genealogies in populations of variable size".
- Anna Kraut initiated a collaboration with Jochen Blath, Tobias Paul und András Tóbiás (after her talk during our workshop) on dormancy in cancer. They investigate how therapies optimally could be adapted to avoid therapy resistance of cancer due to dormancy.
- Anna Kraut worked with Manuel Esser (PhD student of Anton Bovier) on a project on adaptive dynamics with time dependent periodically changing parameters.
- Cornelia Pokalyuk worked with Viktor Bezborodov, Tyll Krüger, Piotr Szymanski and Aurélien Velleret on a project concerning transmission dynamics of infections between cities and a comparison of different containment strategies.

References

- V. Brouard, C. Pokalyuk *Invasion of parasites in moderately structured host populations*, Stoch. Proc. Appl., 153, pp 221-263, 2022
- V. Brouard, C. Pokalyuk, M. Seiler and H. Tran. *Spatial Invasion of Cooperative Parasites*, arXiv:2308.07397
- A. Blancas, A. González Casanova, S. Hummel, S. Palau *Absorption and stationary times for the* Λ*-Wright-Fisher process*, arXiv:2308.09218
- J. Blath, F. Hermann, M. Reitmeier *The Contact Process with Switching*, arXiv:2205.07275
- A. Wences, A. Siri-Jégousse *Exchangeable coalescents beyond the Cannings class*, arXiv.2212.02154.