Mattia Manica, **Andrea Pugliese**, Dept. Mathematics, University of Trento, Italy
Roberto Rosà, Luca Bolzoni, Dept. Biodiversity and Molecular Ecology, Fondazione E. Mach, S. Michele Adige, Italy

Exclusion and spatial segregation in the apparent competition between two hosts sharing macroparasites

We investigate the spatial dynamics of a deterministic model describing two host species experiencing apparent competition mediated by macroparasites. The work is inspired to the system of rock partridge (*Alectoris graeca saxatilis*) and black grouse (*Tetrao tetrix*) sharing a common helminth parasite (*Ascaridia compar*) in a partially common spatial domain in the Italian Alps, and aims at elucidating the general mechanisms of apparent competition in a spatially structured environment.
First, we analyse the behaviour of a single-host macroparasite partial differential equation (PDE) model, both in the cases of uniform or spatially-dependent vital rates of the host, focussing on the role of spatial diffusion on parasite persistence and host abundance. We obtain the threshold condition for parasite persistence, and discuss how this depends on host diffusion coefficient; mpreover, we found (in contrast to what occurs in reaction-diffusion models for an isolated population) that, in the case of spatially-dependent vital rates, increasing the host diffusion coefficient generally results in an increase of the overall host population.
Afterwards, a PDE model featuring spatial diffusion and parasite-mediated competition between two species is analysed in order to understand the role of spatial heterogeneity in hosts coexistence. We assumed a partial overlap among the habitats of the two species, and we found that the shared parasites could cause, depending on the values of the diffusion coefficients of the species, a decrease of the realised habitat and, eventually, the extinction of the species less tolerant to parasite infection. This shows that the presence of regulating parasites renders rather complex the effect of dispersal on population dynamics, and that the dynamics of apparent competition cannot be adequately understood from spatially-independent models.