

Maturation of vertebrate oocytes into haploid gametes relies on two consecutive meiosis without intervening DNA replication. The temporal sequence of cellular transitions driving eggs from G2 arrest to meiosis I (MI) and then to meiosis II (MII) is controlled by the interplay between cyclin-dependent and mitogen-activated protein kinases. In the poster, we propose the first dynamical model of the molecular network that orchestrates maturation of *Xenopus laevis* oocytes. Our model reproduces the core features of maturation progression including the characteristic non-monotonous time course of cyclin-Cdks and unveils the network design principles underlying a precise sequence of meiotic decisions, as captured by bifurcation and sensitivity analyses. Firstly, coherent and sharp meiotic resumption is triggered by the concerted action of positive feedback loops post-translationally activating cyclin-Cdks. Secondly, meiotic transition is driven by the dynamic antagonism between positive and negative feedback loops controlling cyclin turnover. Our findings reveal a highly modular network in which the coordination of distinct feedback and regulatory schemes ensures both reliable and flexible cell-cycle decisions.