



CRBM external seminar 2026

Thursday, **September 24th 11:00** - Marcel Dorée Seminar Room

Dynamics and Scaling of Competitive Actin Architectures

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Dr Alexandra Colin is a CNRS researcher at the CEA in Grenoble, France. She was trained in biology and chemistry. Her research focuses on identifying the physical and chemical parameters that control the self-organizing properties of living systems through various approaches. She has used bottom-up (purified proteins, *Xenopus* egg extracts) and top-down (bacteria, cultured cells, mouse oocytes) approaches to study how cells achieve homeostasis, in terms of size, transport or coexistence between several networks. She is now focusing her research on understanding the dynamic steady state of actin networks using reconstituted systems. She is particularly interested in the mechanisms that allow different structures to coexist when they share limited resources.

Abstract: Cells constantly experience environmental changes requiring a fast adaptation of their different actin structures. However, the mechanisms governing the size and dynamics of these multiple actin structures remain unknown. We have developed a bottom-up approach to identify the key molecular mechanisms that determine the size and coexistence of multiple competing actin architectures. We use a reconstituted system consisting of purified proteins and substrates to localize actin polymerization in microwells, enabling us to work with a limited number of components. With this system, we reconstituted several dynamic actin architectures, competing for a limited pool of protein, over a period of multiple hours. I will show how we used this system to study the limits of scaling in dynamic structures, as well as the limits of coexistence in actin networks under resource-limited conditions. Finally, I will show how we can recapitulate these results in a complementary cellular system, in which we have demonstrated that an increase in spreading area leads to a decrease in overall turnover, due to a predominance of structures with low turnover.

Recent publications:

[Reconstituted systems for studying the architecture and dynamics of actin networks.](#) Cantat A, **Colin A.** Biochem J. 2025.

[Balancing limited resources in actin network competition.](#) Guérin C, N'Diaye AB, Gressin L, Mogilner A, Théry M, Blanchoin L, **Colin A.** Curr Biol. 2025.

[Friction patterns guide actin network contraction.](#) **Colin A**, Orhant-Prioux M, Guérin C, Savinov M, Cao W, Vianay B, Scarfone I, Roux A, De La Cruz EM, Mogilner A, Théry M, Blanchoin L. Proc Natl Acad Sci U S A. 2023.