Cavity polaritons have been shown these last years to be a model solid state system to investigate the physics of bose condensates in a solid state system. However, their very short life time has, up to now, prohibited the formation of a condensate showing spatial coherence far from the excitation spot. In the present work, we report on the spontaneous formation under non resonant excitation of coherent polariton condensates in wire cavities. These condensates expand over macroscopic distances while preserving their spatial coherence (see fig 1a).

We show that these condensates can be manipulated via optical means. This is illustrated with two experiments: i) the synchronization of two condensates through an optically controlled tunnel barrier, and ii) the relaxation of polariton condensates in an optically controlled trap (see fig.1b).

These results open the way toward the development of new optical circuits based on the ultra-fast propagation and manipulation of polariton condensates.

Figure 1: (a) Generation of an extended polariton condensate when exciting a single microwire cavity; (b) Generation of an optical trap where polaritons get confined when exciting a single wire cavity close to its end.