Title: **A domain decomposition method for the numerical approximation of the non-negative solution of non-linear parabolic equations**.

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Abstract:

The aim of this talk is to present a numerical method to compute a numerical approximation of a non-negative solution of semi-linear parabolic equations. It concerns the case of solutions with or without blow-ups. For this purpose, we developpe two different algorithms combining Crank-Nicholson time discretization schema, finite elements approximation, Newton method, and domain decomposition technics.
In the case of the blow-up, we will give an estimation of the maximal time existence of the numerical solution. That estimation is a precise approximation of the maximal time existence of the analytical solution. We will also adapt the para-real algorithm to the non-linear problem. In all cases, the simulations converge and illustrate the performance of the algorithms studied and the coherence of the results with the theory.

This is joint work with: Nahed Naceur, Nour Eddine Alaa and Moez Khenissi.