## **GIUSEPPE ALESSIO D'INVERNO**, International School for Advanced Studies (SISSA), Trieste, Italy *Surrogate models for diffusion on graphs via sparse polynomials*

Diffusion kernels over graphs have been widely utilized as effective tools in various applications due to their ability to accurately model the flow of information through nodes and edges. However, there is a notable gap in the literature regarding the development of surrogate models for diffusion processes on graphs. In this work, we fill this gap by proposing sparse polynomial-based surrogate models for parametric diffusion equations on graphs with community structure. In tandem, we provide convergence guarantees for both least squares and compressed sensing-based approximations by showing the holomorphic regularity of parametric solutions to these diffusion equations. Our theoretical findings are accompanied by a series of numerical experiments conducted on both synthetic and real-world graphs that demonstrate the applicability of our methodology.