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Department of Mathematics, University of Connecticut, Storrs, CT 06269-1009, and **Rodrigo
Trevino**. *Canonical diffusions on the pattern spaces of aperiodic Delone sets.*

We consider pattern spaces of aperiodic and repetitive Delone sets of finite local complexity. These spaces are compact metric spaces and constitute a special class of foliated spaces. We define new Sobolev spaces with respect to the unique invariant measure and prove the existence of the unitary Schrödinger semigroup, which in physics terms may help to describe the evolution of phasons. We define and study natural leafwise diffusion processes on these pattern spaces. These processes have Feller, but lack strong Feller and hypercontractivity properties, and heat kernels do not exist. The associated Dirichlet forms are regular, strongly local, irreducible and recurrent, but not strictly local. For harmonic functions we prove new Liouville and Helmholtz-Hodge type theorems. (Received August 13, 2019)