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Let  $G$  be a proper Lie groupoid. If  $G$  is a foliation or étale groupoid, the the orbit space is an orbifold. In the study of the geometry and topology of orbifolds, an object called the inertia orbifold has played a major role. The inertia orbifold is presented by the Lie groupoid  $G \rtimes \Lambda G$  where  $\Lambda G$  is the space of loops in  $G$ .

If  $G$  is an arbitrary proper Lie groupoid, then  $\Lambda G$  is no longer a smooth manifold so that the inertia groupoid  $G \rtimes \Lambda G$  is no longer a Lie groupoid. Rather, the orbit and arrow spaces of  $G \rtimes \Lambda G$  inherit the structure of a differentiable space (in the sense of Spallek). In this talk, we will discuss the structure of the object and orbit spaces of the inertia groupoid as differentiable stratified spaces and the behavior of these structures with respect to Morita equivalence. (Received August 21, 2013)