

# PUSHOUT OF GROUPOID EXTENSIONS BY GROUP BUNDLES AND THEIR $C^*$ -ALGEBRAS

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ABSTRACT. Given a locally compact groupoid  $\mathcal{G}$  and a locally compact abelian group bundle  $p_{\mathcal{A}} : \mathcal{A} \rightarrow \mathcal{G}^{(0)}$ , an extension  $\Sigma$  of  $\mathcal{A}$  is a locally compact groupoid  $\Sigma$  such that  $\Sigma^{(0)} = \mathcal{G}^{(0)}$  together with maps  $i : \mathcal{A} \rightarrow \Sigma$  and  $p : \Sigma \rightarrow \mathcal{G}$  such that  $i$  is a homeomorphism onto its range,  $p$  is continuous and open,  $i$  and  $p$  restricted to  $\mathcal{G}^{(0)}$  are the identity. In this talk I will present the so called pushout constructions of extensions of groupoids. In a particular case, one can define a  $\mathbf{T}$ -groupoid of an extension. The full and reduced  $C^*$ -algebra of an extension is isomorphic to the full and, respectively, the restricted  $C^*$ -algebra of the corresponding  $\mathbf{T}$ -groupoid. Among the main examples, I will consider extensions by 2 cocycles and prove that the pushout of such an extension is an extension by a 2 cocycle as well. In particular, we describe the pushout of an extension by a normalized Čech cocycle with values in a locally compact abelian group. We prove that its  $C^*$ -algebra is continuous trace and provide a concrete formula for its Dixmier-Douady invariant. This presentation is based on joint work with Alex Kumjian, Jean Renault, Aidan Sims, and Dana Williams.