1154-18-2063 **John C. Baez**, **John D. Foley*** (foley@metsci.com) and **Joe Moeller**. *Network models from Petri nets with catalysts.*

Petri nets are a widely studied formalism for describing how collections of entities of different types can be processed to turn into other entities. More recently, network models were developed as a formal foundation for designing and tasking networks of agents. This work combines these two formalisms to serve complementary roles. We show how Petri nets with catalysts—whose counts at fixed places are preserved, like catalysts in chemistry—can be taken apart and put back together again with network models. Catalysts can be viewed as agent types that provide services for other types in the network. The "taking apart" step filters the Petri net by what can be done when some specific number of catalysts are available. The "putting back together" step is accomplished with the monoidal Grothendieck construction and has the upshot that catalysts—i.e. agents providing services—can be distinguished after this step. (Received September 17, 2019)