1151-20-83   **Rylee A Lyman*** (`rylee.lyman@tufts.edu`). *Train Tracks, Orbigraphs and CAT(0) Free-by-Cyclic Groups.*

Inspired by Thurston's work on surface homeomorphisms, the theory of *relative train track maps* was developed by Bestvina, Feighn and Handel to study outer automorphisms of finite-rank free groups. Given an outer automorphism $\varphi \in \mathrm{Out}(F_n)$, a relative train track map is a homotopy equivalence $f\colon G \to G$ on a graph G with good dynamical properties. Let W be a finite free product of finite groups. We show how to extend the theory of relative train track maps to outer automorphisms of W. Our extension, like the original theory, has the advantage of being built from algorithmic operations on finitary topological objects. In this case, an *orbigraph:* a graph of groups for W with finite vertex stabilizers and trivial edge stabilizers, thought of as a genuine topological object.

As a first application of this technology, we show that—in marked contrast with $\mathrm{Out}(F_n)$—mapping tori of polynomial-growth automorphisms of W are "virtually" CAT(0) groups. (Received August 09, 2019)