1125-05-381 **Robert Davis** (davisr@math.msu.edu), Department of Mathematics, Michigan State University, East Lansing, MI 48824-1027, and **Bruce E Sagan*** (sagan@math.msu.edu), Department of Mathematics, Michigan State University, East Lansing, MI 48824-1027. *Pattern-avoiding polytopes and Bruhat orders I.*

The Birkhoff polytope, B_n, is the convex hull in $\mathbb{R}^{n\times n}$ of the permutations matrices M_σ as σ runs over the symmetric group $\mathfrak{S}_n$. Given a set of permutations Π, let $\mathrm{Av}_n(\Pi)$ denote the set of all $\sigma \in \mathfrak{S}_n$ which avoid the permutations in Π. There is a corresponding polytope $B_n(\Pi)$ which is the convex hull of all M_σ for $\sigma \in \mathrm{Av}_n(\Pi)$. For certain Π these polytopes exhibit very interesting behavior. In particular, we consider $B_n(132, 312)$ and $\tilde{B}_n(123)$ where the tilde indicates that we only take the alternating permutations in $\mathrm{Av}_n(123)$. Restricting weak Bruhat order to these two permutation classes give lower order ideals in Young's lattice for certain shifted and left-justified shapes, respectively. By analyzing EL-shellings of these posets, we obtain information about the corresponding polytopes. (Received August 30, 2016)