Configuration Development Introduction

Goal: Improved configuration by early or mid-June.

A key: Relaxation of PBX constraints. Allow increased aspect ratio at fixed volume.

Ku: Higher ι configurations.
Synergy with higher $R/\langle a \rangle$:

- Higher aspect ratio reduces ripple and aids Mercier stability.
- Increased ι keeps total poloidal flux roughly the same at the higher $R/\langle a \rangle$.

Kessel: Optimization with respect to R/a and κ.
Synergy between higher R/a and higher κ:

- Elongation decreases ι generated by current, counteracting increase at higher R/a which is otherwise problematic.
- Elongation also improves stability.
- Increased R/a decreases ripple, which otherwise becomes a problem at higher κ.

A potential issue: minimum width of cross-section.

Pomphrey, Boozer, Hatcher and Hirshman: Free-boundary optimization in terms of natural functions on winding surface.

- Will allow incorporation of desirable coil properties in objective function.
- Better treatment of coil constraints may allow use of larger number of Fourier modes in boundary description, and may provide access to broader range of configurations. (Fixed boundary approach applies intuitive constraints to shape of outer boundary because of coil concerns. Limits number of modes in surface description.)

A General Concern: Flux surfaces at $\beta = 4\%$. (Monticello)