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Evolutionary Tracks for Betelgeuse[1] MICHELLE DOLAN, GRANT MATHEWS, University of Notre Dame, DAVID DEARBORN, Lawrence Livermore National Laboratory — We have constructed a series of quasi-hydrostatic evolutionary models for the M2 Iab supergiant Betelgeuse (α *Orionis*). Our models are constrained by the observed temperature, luminosity, surface composition and mass loss for this star, along with recent parallax measurements and high resolution imagery which directly determine its radius. The surface convective zone obtained in our model naturally accounts for observed variations in surface luminosity and the size of detected surface bright spots. In our models these result from upflowing convective material from regions of high temperature in a surface convective zone. We also account for the observed periodic variability as the result of the effective equation of state in a simple linear pulsation model. Based upon a comparison between the accumulated mass loss in the observed circumstellar shell, and the lower limit on luminosity we suggest that this star most likely has a mass of either $\approx 16 \pm 2$ $M_\odot$ if a Reimers lass loss rate applies or 20 ± 2 for the de Jager mass loss rate. For any mass loss rate the star must be close to the tip of the first ascent up the giant branch.

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