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Challenges for age-dating young stellar clusters

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Young massive clusters (YMCs) offer an exceptional opportunity to test our understanding of stellar evolution, due to the large numbers of stars in all phases of evolution. High precision CMDs of YMCs have shown unexpected features (e.g., extended main sequence turnoffs and dual main sequences), that originally were thought to suggest that large (100s of Myr) age spreads were present within the clusters. However, subsequent work has shown that stellar rotation is the most probably explanation. YMCs also offer our best hope in understanding the origin of the multiple populations phenomenon that is observed in (nearly) all ancient globular clusters. By using a ~2 Gyr YMC that displays multiple populations, we can test scenarios for their origin. By age dating both populations, an upper limit to any age difference of ~10 Myr can be placed. This calls into question models that invoke multiple generations of star formation within massive clusters as the origin of multiple populations.

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