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ASASSN-15hy: An Underluminous, red 03fg-like Type Ia Supernova JING LU, Florida State University, CHRIS ASHALL, University of Hawaii, ERIC HSIAO, Florida State University, CSP COLLABORATION — We present observations of the 03fg-like (super-Chandrasekhar) SN Ia ASASN-15hy. It is bright in the UV and NIR, lacks a clear i-band secondary maximum, shows a strong and persistent C II feature, and has a low Si II λ6355 velocity. However, some properties are also extreme among the subgroup. ASASN-15hy is underluminous, red, yet slowly declining. It has the most delayed onset of the i-band maximum of any 03fg-like SN. ASASN-15hy lacks the H-band break that is typically present during the first month in normal SNe Ia. Such events may be a potential problem for high-redshift SN Ia cosmology. ASASN-15hy may be an explosion of a degenerate core inside a nondegenerate envelope. The explosion impacting the nondegenerate envelope with a large mass provides additional luminosity and low ejecta velocities. An initial deflagration burning phase is critical in reproducing the low ^{56}Ni mass and luminosity, while the large core mass provides the diffusion time scales to produce the broad light curves. The model consists of a rapidly rotating 1.47 $M_{\odot}$ degenerate core and a 0.8 $M_{\odot}$ nondegenerate envelope. This deflagration core-degenerate scenario may result from the merger between a white dwarf and an asymptotic giant branch stars core.

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