# The Circumstellar Dust Shell Around the Likely Progenitor Star of SN 2017eaw

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Stars of initial masses $8 - 17 M_{\odot}$ are likely to evolve through red supergiant (RSG) stage and burst into core-collapse supernovae shortly after. This process may be a significant contribution to cosmic dust, and also have critical influence on the possible circumstellar material around the progenitor of supernova. A RSG found in archived data is identified to be the progenitor star of the Type II-P supernova (SN II-P) 2017eaw in NGC 6946. In this work, we model the circumstellar dust shell around the progenitor star by fitting the photometric observations carried out by Hubble Space Telescope (HST) and Spitzer Space Telescope (Spitzer) at $\sim$ 200 d before the explosion. By assuming a central star of $\sim$ 3300 K obscured by a circumstellar dust shell, the dereddened spectral energy distribution (SED) of the RSG is reproduced with a radiation transfer equilibrium process. Synthesized spectra calculated from MARCS code are utilized as intrinsic stellar SEDs. Dust grains are assumed to be a power law ($dn/da \propto a^{-\alpha}$) distributed in size and a modified power law [$dn/dr \propto (1 - r_{\rm in}/r)^{\beta}(r_{\rm in}/r)^{\gamma}$] distributed in density along the shell radius. As to the dust components, we consider both astronomical silicate and amorphous carbon. The best fitting suggests that the dust shell had an inner edge of $\sim$ 18 AU and extended beyond 5000 AU with distribution indices $\alpha \sim 4.6, \beta \sim 5$ and $\gamma \sim 3$. The derived optical depth is around 1.8 which is consistent with other previous results.