

Dear Sir or Madam.

I hereby apply for the Postdoctoral Fellowship in Astronomy with subtitle Time Domain Science at Caltech. I have been a graduate student at the Department of Astronomy at Stockholm University since May 2009 and I will receive my PhD degree in early 2015. My supervisors have been Jesper Sollerman and Claes Fransson, and during this time I have worked mainly with the progenitor-supernova (SN) connection, i.e. what are the progenitor stars of which core-collapse (CC) SNe. The work spans from the observational (e.g. data reduction) to the theoretical (e.g. hydrodynamical modelling), with focus on Type IIb SNe and SN 2011dh (PTF11eon) in particular (Paper I-VI).

I am well acquainted with the PTF/ZTF survey through the Stockholm engagement, and I have had the pleasure to collaborate on the Spitzer MIR data for SN 2011dh (Paper IV) with the Caltech scientists Mansi Kasliwal and George Helou. Surveys like PTF/ZTF provides the opportunity to collect large unbiased samples of SNe with early coverage and well-constrained explosion epochs. Such samples are ideal for studies of the progenitor and SN parameters using lightcurve and spectral modelling, and provides an opportunity for me to advance the methods used in Paper I-VI. As a software engineer by profession (see CV) I can also contribute on the technical side, and I would be happy to participate in the development of the ZTF software.

My research and my plan to advance it are summarized in the research plan, where I discuss how hydrodynamical lightcurve modelling and multi-method studies of SN samples, as well as of individual nearby SNe, could improve our knowledge of the progenitor-SN connection. Given the increasing amount of data obtained by surveys like PTF/ZTF, and the ever increasing computational speed, I think that considerable advancements in this field are possible in the near (few-years) future.

Best regards,

Mattias Ergon