

Dear Sir or Madam.

I hereby apply for the Postdoctoral Fellowship in Supernova Studies at Queens University Belfast (QUB). 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. radiative-transfer and hydrodynamical modelling), with focus on Type IIb SNe and SN 2011dh in particular (Paper I-VI).

As discussed in the research plan, I propose to focus the work on two different but related subjects, the development of the ARTIS code to model nebular spectra, and a continuation of my work on the progenitors of CC SNe. I am well acquainted with Monte-Carlo (MC) based spectral modelling in both the photospheric and nebular phase from my own work (Paper II) as well as the from my work together with Anders Jerkstrand (Paper IV and V). I find the opportunity to further develop the state-of-the-art spectral code ARTIS quite exciting and a great opportunity to improve my knowledge. I also believe that my work on hydrodynamical lightcurve modelling (Paper IV and VI) is in line with current efforts at QUB.

Much of my work on the progenitor-SN connection have been in collaboration with scientists at QUB, including Stephen Smartt, Anders Jerkstrand, Morgan Fraser, Justyn Maund and Rubina Kotak. In the research plan I discuss how to advance this work and how hydrodynamical lightcurve modelling and multi-method studies of CC SN samples, as well as of individual nearby CC SNe, could improve our knowledge of their progenitor stars. Given the increasing amount of data obtained by surveys like Pan-STARRS and PESSTO, 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