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MODELLING THE RADIO TO X-RAY SED OF GALAXIES

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Our multi-wavelength model GRASIL for the SED of galaxies is described, in particular the recent extension to the radio and X-ray range. With our model we can study different aspects of galaxy evolution by exploiting all available spectral observations, where different emission components dominate.

UV TO SUBMM: The UV to submm model is well established and has been applied in several aspects of the study of galaxy evolution (Silva et al. 1998, Bressan et al. 1998, Granato et al. 2000, 2001).

RADIO: We have extended our model to the radio range (Bressan, Silva & Granato 2002) with both the thermal ($\propto$ ionizing luminosity) and the non thermal emission ($\propto$ SNRate). The radio emission coupled with the FIR provides a diagnostic tool to constrain the age of starbursts (Figure 1).

X-RAY: We have included the contribution of stellar populations to the X-ray emission of staburst galaxies. Following Van Bever & Vanbeveren (2000) we consider: Binaries with a NS or a BH as a primary, and a OB star as a secondary, pulsars, SN remnants. The main uncertainties are the binary fraction, the minimum mass for BH formation, the initial spin period of pulsars (whose $L_X \propto P_0^{-2}$), and the spectral shape to assign to the different components. In Figure 2 the X-ray SED expected for M82 according to the model fitting its UV to radio SED is compared to observations (Moran & Lehnert 1997, Cappi et al. 1999).

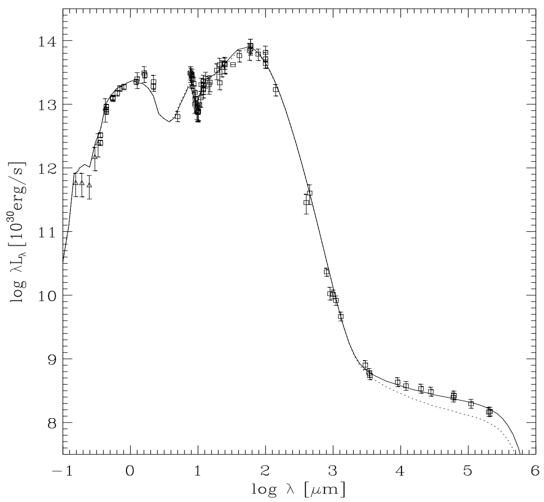

Fig. 1. Fit to the SED of M82: models with different starburst age are degenerate in the UV to submm but not in the radio.

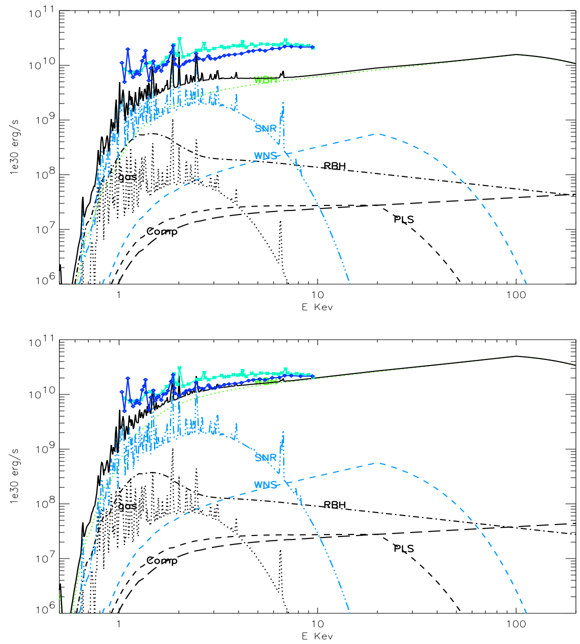

Fig. 2. Above: minimum mass for BH formation= 14 M$_\odot$, M_{BH} = 5 M$_\odot$. WBH, WNS= wind-fed BH and NS, RBH=Roche-lobe fed BH, PLS=Pulsars, SNR= supernova remnants. Gas and IC emissions are arbitrarily scaled. Below: same but M_{BH} = 10 M$_\odot$

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