STELLAR POPULATIONS OF BCD GALAXIES FROM SPECTRO-PHOTOMETRIC EVOLUTIONARY SYNTHESIS

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ABSTRACT. Evolutionary synthesis models have been computed to construct the spectral energy distributions of BCD galaxies in the optical and NIR ranges (0.3 to 3.5μm). Evolutionary tracks for stars having $Z = 1/10\, Z_{\odot}$ have been employed in order to match the observed low metal abundances of BCDs. Gaseous emission from H II regions has been included in the model. A starburst (of duration $5 \cdot 10^6\ yr$) is superimposed on an underlying component of red stars characterised by continuous star formation. Burst parameters, star formation rates and ionised hydrogen gas masses have been deduced by fitting the models to observed spectral energy distributions (SEDs) of BCDs.

Results

During strong bursts up to 50% of the total emission in the NIR may be produced by the nebular continuum. Gaseous emission lines do not contribute significantly to the total flux in the NIR. In the optical range line emission may produce up to 40% of the total flux (V and R bands), whereas the gaseous continuum provides only about 10%. Stellar emission in the NIR of both the underlying component and the starburst galaxy are mostly produced by red giants. The optical range (B band) is generally dominated by main-sequence stars during the starburst. Supergiants dominate for about $3 \cdot 10^7\ yr$ during strong bursts, especially in the NIR.

Observed SEDs of BCDs (Thuan 1983, Loose et al. 1991) can be well reproduced by models of varying burst strength and small amounts of internal extinction. If the IMF allows for the formation of stars between 0.04 and 120 $M_{\odot}$, typically $\sim 1 M_{\odot}\, yr^{-1}$ of gas is transformed into stars and burst parameters b lie in the range between 0.005 and 0.02. Supposing only stars more massive than 5 $M_{\odot}$ are formed, these numbers decrease by a factor of 8 (Krüger et al. 1991). Less than 1% of the hydrogen gas present in BCDs is ionised by hot massive stars.

References

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