

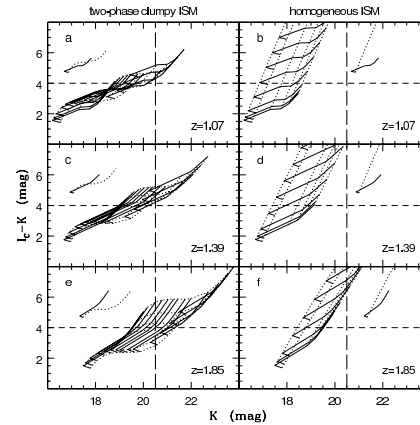
**The extremely red galaxies (ERGs) at  $1 \leq z \leq 2$  have a mixed nature. Their observed optical/near-IR colours may be reproduced by models of either old ( $> 1$  Gyr), passively evolving stellar populations, or dusty starbursts with young/intermediate-age stellar populations, but also by models of the early (with a delay up to 1 Gyr), dusty, post-starburst phases of galaxy formation.**

Near-IR/optical colours like  $I_c - K \geq 4$ , significantly different from those of typical field objects, are used to select ERGs in existing deep surveys. The ERGs are held to witness either the full assembly of massive (with a stellar mass  $\geq 10^{11} M_\odot$ ) galaxies at high redshift ( $z > 1$ ), or, conversely, a large amount of star-formation activity, largely enshrouded by dust. A two-colour classification method for ERGs was proposed to distinguish between objects at  $1 \leq z \leq 2$  that host either old, passively evolving stellar populations, or on-going star formation in a dusty interstellar medium (ISM) (Pozzetti & Mannucci 2000 – PM00). Pierini et al. (2004) model old, passively evolving stellar populations (in a dusty ISM or not) plus dusty starburst and post-starburst galaxies (DSGs and DPSGs, respectively) by combining results from stellar population evolutionary synthesis models (Fioc & Rocca-Volmerange 1997; Maraston 1998) for extreme star-formation histories (young/intermediate-age stellar populations in DSGs) and from Monte Carlo computations of radiative transfer of the stellar and scattered light through different dusty media (Witt, Thronson, & Capuano 1992; Witt & Gordon 2000). As main results, Pierini et al. (2004) show that

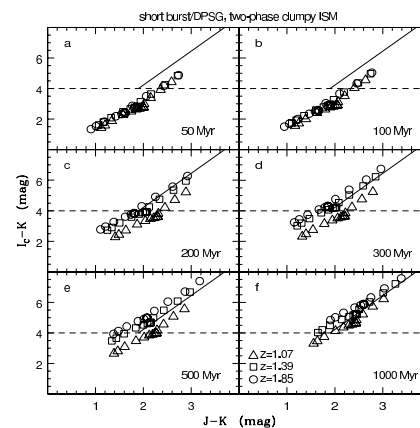
- the statistical significance of the PM00 method is confirmed, but this method breaks down if objects undergoing an early post-starburst phase and still retaining their dusty ISM exist at  $1 \leq z \leq 2$ ;
- the interpretation of dusty ERGs is affected by potential observational biases and uncertainties on the properties of the ISM (see Fig. 1 and 2).

#### REFERENCES:

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**Figure 1:**  $I_c - K$  vs.  $K$  for model DSGs with a 100 Myr-burst and DPSGs, as a function of redshift, opacity ( $\tau_V$ ), and structure of the dusty ISM. Solid or dotted lines connect models with constant  $\tau_V$  or age. The behaviour with increasing age (solid line) or increasing  $\tau_V$  (dotted line) is shown in each panel.



**Figure 2:**  $I_c - K$  vs.  $J - K$  for the models in the left column of Fig. 1. In each panel models of selected age are reproduced as triangles, squares or circles according to their redshifts, with  $\tau_V$  increasing from 0.25 to 50 from the lower left to the upper right.