Are major mergers important?

Sugata Kaviraj
Hertfordshire

Sydney
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With: Seth Cohen, Rogier Windhorst, Joe Silk, Richard Ellis, Avishai Dekel and the WFC3 Science Organising Committee
Are major mergers important?

- Do major mergers contribute significantly to cosmic star formation at $z \sim 2$?

- Do major mergers create spheroids in the early Universe?
Are major mergers important drivers of SF?

- Many massive high-redshift star-formers are disks (e.g. Genzel+08, 11, Forster-Schreiber +06, Mancini+11)

- Desirable to quantify proportion of cosmic SF driven by major mergers

- WFC3 ERS: visually split (M*>10^{10} M_\odot) sample into spheroids, late-types and major mergers

SF main sequence split by morphology at $z \sim 2$

- Estimate galaxy SFRs from SED fitting
- Recover SF main sequence (e.g. Daddi+05, Reddy+12)
- Major mergers and LTGs overlap in SFR-M* space

SF budget split by morphology at $z\sim 2$

- Major-merger contribution $\sim 27\%$

- But background SF level already quite high at $z\sim 2$ (e.g. Law+12, Di Matteo+07, Dekel+09)

- Subtract ‘secular’ SF - major merger contribution $< 15\%$

- Overall contribution of major-mergers to cosmic SF at $z\sim 2$ is small

Do major mergers create spheroids?

Do major mergers create spheroids?

- Only major mergers (mass ratios <1:3) are visible in ERS images
- Lack of tidal features around a blue spheroid indicates that it did not experience a recent major merger

Lack of tidal features in newborn spheroids

- At least 50% of blue spheroids show no tidal features indicative of major mergers
- Are at least some spheroids forming directly via violent disk instability (e.g. Dekel+09)?
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Mild SF enhancement in major merger remnants

- At least 50% of blue spheroids show no tidal features indicative of major mergers
- Are at least some spheroids forming directly via violent disk instability (e.g. Dekel+09)
- SSFR enhancement in disturbed spheroids is modest (consistent with morphological analysis)
- Major mergers unlikely to be creating a large fraction of spheroids at 1<z<3

The role of merging over cosmic time
GZ + CANDELS + HerMES + PEP
Are (major) mergers important?

- Do major mergers contribute significantly to SF budget at $z \sim 2$?
  

- Do major mergers create early spheroids?
  
  $50\%+$ of blue spheroids at $z \sim 1.5$ have not experienced a recent major merger (SK et al. 2013, MNRAS, 428, 925)

- Role of merging in driving strong star formation diminishes quickly after $z \sim 1$
The role of merging over cosmic time