

# Processing of nano dust particles in galaxies†

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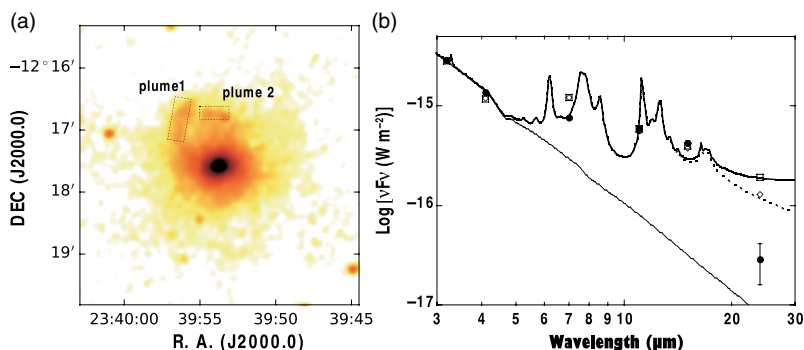
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A family of emission bands observed in the near- to mid-infrared are attributed to the emission from nano-sized dust containing polycyclic aromatic hydrocarbons (PAHs) or PAH-like atomic groups. Investigations of variations of the emission bands (hereafter PAH emission) in violent conditions are thus significant for the study of the processing of nano-sized dust particles. Infrared observations of the Infrared Camera (IRC) on board *AKARI* (Onaka *et al.* 2007) have clearly shown that the PAH emission is detected in an H $\alpha$  filament produced by winds from super star clusters in the nearby starburst dwarf galaxy NGC 1569 (Onaka *et al.* 2010). Recent analysis of IRC observations of two merger galaxies, NGC 2782 and NGC 7727, also shows that the PAH emission is prominently seen in extended structures produced by merger events (Fig. 1a, Onaka *et al.* 2018). The mid-infrared spectral energy distribution (SED) of the extended structures in both galaxies shows a sharp decline at 24  $\mu\text{m}$ , which cannot be accounted for even if the contribution from very small grains (VSGs) is removed (Fig. 1b). These results suggest nano-sized



**Figure 1.** (a) IRC 7  $\mu\text{m}$  band image of NGC 7727 and (b) the SED of Plume 2. The thick line and dotted line indicates the model SEDs with VSGs and without VSGs, respectively, using the DUSTEM model (Compiègne *et al.* 2011). The thin solid line indicates the assumed stellar component. See Onaka *et al.* (2018) for details.

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dust particles may be produced by fragmentation of larger carbonaceous grains (e.g., VSGs) in violent conditions (see [Onaka \*et al.\* \(2018\)](#) for detailed discussion).

## References

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