Young, Blue, and Isolated Stellar Systems in the Virgo Cluster

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The Virgo galaxy cluster is a hostile environment

- Virgo is the closest galaxy cluster to us, at a distance of about 50 million lightyears.

- Galaxy clusters are filled with hot, ionized gas, called the intra-cluster medium (ICM).

- Star-forming galaxies need cold gas to fuel their star formation.

- A galaxy cluster is a very hostile environment for this cold gas.

- Even large galaxies similar to our Milky Way rapidly lose their gas in a cluster.
Tiny oases in a desert

- We have identified 5 irregular, blue, and isolated stellar systems in the Virgo cluster.

- Dominated by young and blue stars.

- A million times less massive than our galaxy.

- We colloquially refer to these objects as "blue blobs."
Formed from pre-enriched gas

• Generally bigger galaxies are richer in heavy elements, that is they are of higher "metallicity."

• These blue stellar systems do not follow this trend.

• This is a telltale sign that they formed from gas stripped from a large galaxy.
How did they form?

Tidal stripping:
• Interaction of 2 or more galaxies.
• Gravity pulls out gas and stars.
• Gas collapses to form dwarf.

Ram pressure stripping:
• Galaxy falling into a cluster.
• ICM forces gas out of the galaxy.
• Stars form in the wake.

Tidal dwarf galaxies forming in gas-rich tidal tails

Ram pressure forcing out gas from a galaxy.
How did they become so isolated?

• Tidal dwarf galaxies are typically ejected at <400 km/s.

• They would take billions of years to become isolated.

• Ram pressure stripping can occur at >1000 km/s.

• Isolation is more naturally explained in the ram pressure stripping scenario.

Simulation of ram pressured stripped gas and new stars. 
Kapferer et al. 2009
A new class of stellar system

• "Blue blobs" reside in a galaxy cluster, but are isolated and made up of young stars, making them unlike any other known stellar systems.

• Their high metallicities indicate that they formed from stripped gas.

• Formation via ram pressure stripping is the mechanism that most naturally explains their properties, in particular their isolation.

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