assumptions of Reipurth and Mikkola's simulations will need to be checked — such as that the three stars in a triplet begin their lives with equal masses. It will be necessary to assess how important these assumptions are to the study's main conclusions.

Ongoing surveys should be able to test some of Reipurth and Mikkola's predictions, including the proportion of triplets in stellar populations of different ages and the number of triplets that are dominated by the mass in the tight binary as opposed to the mass of the third star. The work also presents speculations that may be testable by other means, such as the possibility that some tight pairs within triplets spiral towards one another and merge, creating a true wide binary. Moreover, as extrasolar planets continue to be found in various types of stellar family, it would be valuable to have quantitative predictions for the survivability of planets from both the triplets-as-twins and cluster-dispersal mechanisms. As for our neighbouring wide binary, Proxima Centauri and α Centauri, it is in fact a triplet: α Centauri is a tight pair, with a planet to boot[11]. ■

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1. Reipurth, B. & Mikkola, S. *Nature* **492,** 221–224 (2012).
2. Innes, R. T. A. *Union Obs. Circ.* **30,** 235–236 (1915).
3. Wertheimer, J. G. & Laughlin, G. *Astron. J.* **132,** 1995–1997 (2006).
4. Dhital, S., West, A. A., Stassun, K. G. & Bochanski, J. J. *Astron. J.* **139,** 2566–2586 (2010).
5. Sesar, B., Ivezić, Ž. & Jurić, M. *Astrophys. J.* **689,** 1244–1273 (2008).
6. Bate, M. R. & Bonnel, I. A. *Mon. Not. R. Astron. Soc.* **356,** 1201–1221 (2005).
7. Kouwenhoven, M. B. N. *et al. Mon. Not. R. Astron. Soc.* **404,** 1835–1848 (2010).
8. Moeckel, N. & Clarke, C. J. *Mon. Not. R. Astron. Soc.* **415,** 1179–1187 (2011).
9. Law, N. M., Dhital, S., Kraus, A., Stassun, K. G. & West, A. A. *Astrophys. J.* **720,** 1727–1737 (2010).
10. Dhital. S. *et al. Astron. J.* **143,** 67 (2012).
11. Dumusque, X. *et al. Nature* **491,** 207–211 (2012).

ASTRONOMY

Clearing up the dust

Constructing the history of star formation over cosmic time requires an understanding of how starlight is absorbed by dust in galaxies. It now seems that there is less universality in such absorption across galaxies than expected.

AMY BARGER

One of the main tools for studying how galaxies form and evolve is to measure the rate at which massive stars are born in galaxies per unit volume of the Universe. However, some of the light emitted by stars in galaxies, especially light at ultraviolet and visible wavelengths, can be absorbed by dust (grains of silicon and carbon up to a few hundred micrometres in size) that is present in the galaxies. This absorption means that the rate at which massive stars are forming cannot be measured accurately. One way to solve this problem is to observe galaxies at longer wavelengths — the infrared regime — where the dust grains re-radiate the light. The ultraviolet and infrared data can then be combined for each galaxy to account completely for the emission produced by the stars. However, infrared data are not usually available for large samples of distant galaxies. Thus, a second approach is to try to apply a dust correction to the data. Writing in *Astronomy & Astrophysics*, Buat *et al.*[1] have attempted to determine how best to do this for a large sample of distant galaxies, at least in a statistical way.

Deciding what wavelength-dependent dust corrections to apply to galaxies is a classic problem. Even for nearby galaxies, it is uncertain[2–4] whether there is a 'bump' in the dust extinction curve at 217.5 nanometres, which may relate to the grain size distribution or composition; an extinction curve describes how the dust absorption changes with wavelength. Extinction curves along sight lines towards stars in the Milky Way show a strong bump at this wavelength. However, the bump is weaker towards stars in galaxies of the neighbouring Large and Small Magellanic Clouds. At higher redshifts, there is evidence[5,6] for the presence of such a bump in at least some galaxies, but the extinction curve of a local 'starburst' galaxy[7], which does not display a bump, is usually adopted in correcting for dust absorption in distant galaxies. (Redshift is what is measured directly by spectroscopy. Because of the Universe's expansion, the light from distant sources has been stretched, shifting the wavelengths towards the red end of the spectrum. The more the light is shifted to the red, the farther away, and thus the older, the source is.)

Fortunately, the many new observations obtained for the distant Universe — including far-infrared data from the Herschel Space Telescope, mid-infrared data from the Spitzer Space Telescope and optical-to-near-infrared data from ground-based telescopes — have made it possible to study dust absorption at high redshift. Buat *et al.* used all of these data to study the dependence of dust absorption on a variety of global galaxy properties, such as observed luminosity, stellar mass and the slope of the spectrum in the ultraviolet, for a large sample of galaxies with redshifts in the range 0.95–2.2. At these redshifts, optical observations sample the stars' emission of ultraviolet light — the wavelength regime at which massive stars emit most of their light and suffer the most absorption by dust.

Buat and colleagues used a detailed computer code[8] that derives properties of galaxies by fitting the light emission predicted from the computations to observations made across the wavelength spectrum. They concluded that the inclusion of infrared data improved the determination of dust-absorption parameters. Interestingly, they found a wide range of values for these parameters, which they postulate could be due to the large variations in the extinction curves for galaxies. They infer that a constant extinction curve for all galaxies at all redshifts cannot be assumed, and that variations should be allowed for when computing the amount of reprocessed ultraviolet light.

The authors' finding that infrared data are crucial for studies of the effects of absorption by dust in individual galaxies makes sense — previous work has shown how notoriously difficult it is to predict far-infrared emission from observed ultraviolet emission[9]. The study's goal was to find dependences of the dust-absorption parameters on global galaxy properties, which Buat *et al.* hoped to use to correct large samples of galaxies in a statistical way. Although they did identify some trends, there is large scatter about the averages of the parameters that needs to be further understood. This serves as a reminder that if the galaxy property one is trying to calculate is strongly dependent on an assumed dust extinction curve, then one should be cautious about the result. Studies such as this are essential for determining the reliability of dust-absorption corrections. These corrections are pivotal in determining the extent to which massive star formation in galaxies is hidden from optical view. ■

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1. Buat, V. *et al. Astron. Astrophys.* **545,** A141 (2012).
2. Wijesinghe, D. B. *et al. Mon. Not. R. Astron. Soc.* **410,** 2291–2301 (2011).
3. Wild, V. *et al. Mon. Not. R. Astron. Soc.* **417,** 1760–1786 (2011).
4. Conroy, C., Schiminovich, D. & Blanton, M. R. *Astrophys. J.* **718,** 184–198 (2010).
5. Noll, S. & Pierini, D. *Astron. Astrophys.* **444,** 137–155 (2005).
6. Buat, V. *et al. Astron. Astrophys.* **533,** A93 (2011).
7. Calzetti, D. *et al. Astrophys. J.* **533,** 682–695 (2000).
8. Noll, S. *et al. Astron. Astrophys.* **507,** 1793–1813 (2009).
9. Chapman, S. C. *et al. Mon. Not. R. Astron. Soc.* **319,** 318–330 (2000).