ELTs will obviously be powerful machines to study the first galaxies. Large territories remain unexplored in the early Universe!

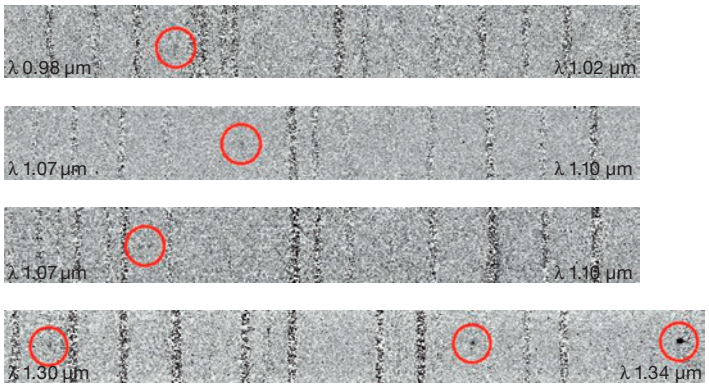

Figure 4: Sky-subtracted 2D ISAAC spectra showing examples of objects with emission line detections marked by red circles in the J band. From top to bottom: A $z = 7.17$ candidate in AC114, a $z = 7.89$ candidate in Abell 1835, an intermediate-z galaxy identified by its [OII] λ3727,3729 doublet, and the $z = 1.68$ emission line galaxy discovered by Richard et al. (2003, A&A 412, L57). The black vertical lines correspond to sky lines.

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VLT Images of a Disintegrating Comet

On the night of 23 to 24 April, the VLT observed fragment B of the comet Schwassmann-Wachmann 3 that had split a few days earlier. The ESO astronomers were surprised to discover that the piece just ejected by fragment B was splitting again. Five other mini-comets were also visible. The comet thus seems doomed to disintegrate but the question remains in how long a time.

Comet 73P/Schwassmann-Wachmann 3 (SW 3) revolves around the Sun in about 5.4 years, in a very elongated orbit that brings it from inside of the Earth's orbit to the neighbourhood of Jupiter. In 1995, when it was coming 'close' to the Earth, it underwent a dramatic and completely unexpected thousandfold brightening. Observations in 1996, with ESO's NTT and 3.6-m showed that this was due to the fact that the comet had split into three distinct pieces. Later, in December 1996, two more fragments were discovered. At the last comeback (in 2001), of these five fragments only three were still seen, the fragments C (the largest one), B and E. No new fragmentation happened during this approach, apparently.

Things were different this time, when the comet again moved towards its closest approach to the Sun, and to the Earth. Early in March, seven fragments were observed, the brightest (fragment C) being magnitude 12, while fragment B was 10 times fainter still. In the course of 6 March new fragments were seen.

Early in April, fragment B went into outburst, brightening by a factor 10 and on 7 April, six new fragments were discovered, confirming the high degree of fragmentation of the comet. On 12 April, fragment B was as bright as the main fragment C, with a magnitude around 9. Fragment B seemed to have fragmented again, bringing the total of fragments close to 40, some being most probably very small, boulder-sized objects with irregular and short-lived activity.

The new observations reveal that this new small fragment has split again. The image clearly reveals that below the main B fragment, there is a small fragment that is divided in two and a careful analysis reveals five more tiny fragments almost aligned. Thus, this image alone shows at least seven fragments. The comet has thus produced a whole set of mini-comets. Will this process continue? Will the comet finally totally disintegrate? Further observations are planned.

The observations reported here were made with FORS1 on the VLT. The fragment was observed in four bands (*B*, *V*, *R*, and *I*) for a total of 30 minutes by Emmanuel Jehin, Olivier Hainaut, Michelle Doherty, and Christian Herrera, all from ESO. The astronomers had the telescope track the comet, which explains why the stars appear as trails of coloured dots, each colour corresponding to the order in which the observations were done in the various filters. At the time of the observations, the comet was 26.6 million km away from the Earth, in the constellation Corona Borealis. The final processing of the image was done by Hans Hermann Heyer and Olivia Blanchemain (both ESO).

(From ESO Press Photo 15/06)

Broken fragments of comet SW-3.