The Sculptor Dwarf Irregular Galaxy and a Large Extragalactic Gas Cloud Detected with the Nançay Radiotelescope

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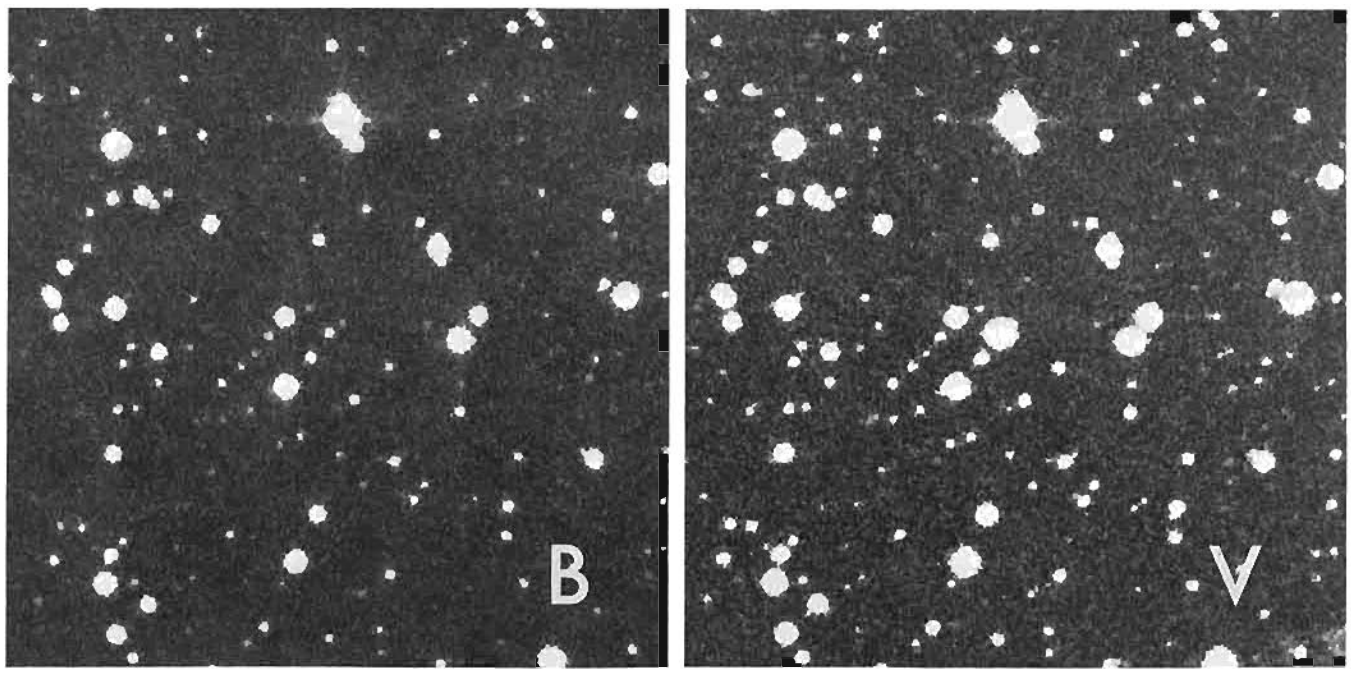
On the cover of the December 1976 issue of THE MESSENGER was reproduced one of the first photos taken with the new ESO 3.6-m telescope: it represented a dwarf irregular galaxy in the southern constellation Sculptor. This galaxy was named SDIG by Drs. Laustsen, Richter, van der Lans, West and Wilson who reported about its optical properties in *Astronomy & Astrophysics* 54, p. 639 (January 1977). The Messenger photograph clearly shows resolved blue supergiant stars, which allowed the ESO astronomers to estimate the distance of SDIG at about 3 megaparsecs, or 9 million light-years.

On December 1, soon after we heard about this discovery, we looked at the galaxy with the Nançay radiotelescope in the 21-cm line of atomic hydrogen (the radiotelescope can reach declinations as far south as –37°). SDIG was seen at the very first run, with a radial velocity of 220 km/s with respect to the local standard of rest. This radial velocity is just in the range of the velocities of the Sculptor group of galaxies, thus confirming the membership of SDIG to this group and the distance found optically. From our observation, we can estimate the mass of hydrogen in this galaxy, which is of the order of 10^7 times the mass of the Sun. However, the absolute luminosity of SDIG is only 3×10^8 times the luminosity of the Sun. Therefore SDIG must be very rich in gas, probably one of the richest galaxies known today. Other dwarf irregular galaxies usually contain proportionally about 3 to 5 times less gas. It seems that star formation has only just begun in SDIG, or at least that we observe a recent major burst of star formation with little star formation before.

But we were even more surprised when we saw that the 21-cm spectrum showed not only the line emitted by



AN EXTREMELY RED STAR

Compare the two photos above. They are both taken with the ESO Schmidt telescope, the left on December 24, 1976 (IIa-O + GG 385, 30 min) and the right on December 23 (103a-D + GG 485, 40 min). These emulsion/filter combinations mean that the left photo records only blue/violet light and the right yellow/green, or standard colours B and V, respectively. The star in the centre is approximately 4–5 magnitudes brighter in V than in B, i.e. $(B-V) \simeq 4\text{–}5^m$. The position is R. A.= $07^h21^m08^s$; Decl. = –20°59'2 (1950). The star is seen on the Palomar Atlas; it does not appear to be variable, and it is even brighter in the red.

Few such red stars are actually known. In a recent list (*Astronomy & Astrophysics Supplement Series* 27, 249), two German astronomers, Drs. Weinberger and Poulakos from the Max Planck Institute in Heidelberg, give the coordinates of fifteen stars with $(B-V) \simeq 4^m$, all of which are far north of the celestial equator. Some of their stars are carbon stars, but others could not be classified.

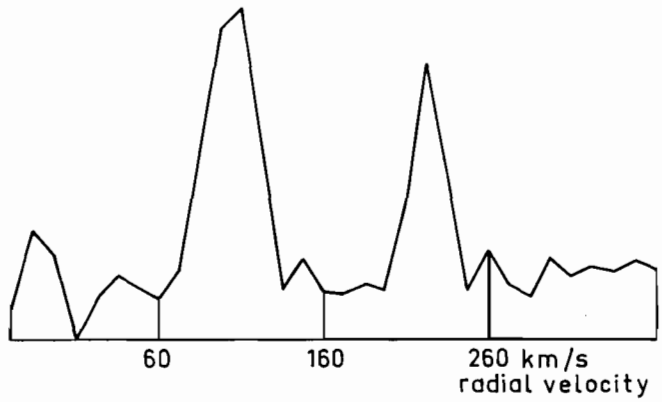
Why is this star so *red*? Is it reddened by interstellar absorption, or is it just very red because of strong molecular bands in its spectrum? Has it emission lines?

We expect to observe the spectrum of this strange object early in March and to inform the readers of THE MESSENGER about the result in the next issue.

SDIG, but another one somewhat stronger, at a velocity of + 100 km/s with respect to the local standard of rest. Further observations have shown that this line comes from a large hydrogen cloud, about 1° in extent, which is in the direction of SDIG but not concentric with the galaxy. We think that this cloud is extragalactic and presumably also belongs to the Sculptor group of galaxies, but this will be hard to prove definitively. In any case, its radial velocity proves that it does not belong to the Magellanic Stream. Radioastronomers had already discovered around the major galaxies of this group, NGC 55 and NGC 300, several such clouds obviously associated with them. Is the new cloud associated with SDIG? We do not know.

The only chance to check this point would be to find some stars possibly formed from the gas of the cloud and to determine the distance of those stars. We have not yet completely mapped the cloud. A provisional estimate of its mass gives some 3 x 10^8 times the mass of the Sun, if the distance is that of the Sculptor group. It seems that we are dealing with a rather massive intergalactic cloud which might be sitting there since the early times of the Universe and has not yet had the opportunity of condensing into stars. There are very few of these objects known today.

This study shows the interest of concerted optical and radio observations. These observations allowed us to find not only a galaxy where only a small amount of gas has been used up to make stars, but also a large mass of gas, where apparently star formation has not yet begun.



21-cm spectrum of SDIG obtained with the Nançay Radiotelescope. At the higher radial velocity, one sees the hydrogen line emitted by SDIG. The line at the lower radial velocities is emitted by an isolated, probably extragalactic, hydrogen cloud which extends over one degree. The radial velocities are relative to the local standard of rest.

Visiting Astronomers

April 1—October 1, 1977

Observing time has now been allocated for period 19 (April 1 to October 1, 1977). As usual, the demand for telescope time was much greater than the time actually available.

The following list gives the names of the visiting astronomers, by telescope and in chronological order. The complete list, with dates, equipment and programme titles, is available from ESO/Munich.

152-cm Spectrographic Telescope

April: Megessier, Hultqvist, Oyen, Breysacher/Muller/Schuster/West, Schnur, Andersen.

May: Andersen/Nordström, Ahlin, van Dessel, Wamsteker, de Loore, Breysacher/Chu-Kit, Surdej.

June: Gahm, Pedersen, Pakull, Westerlund, Ratier, Terzan, Mauder.

July: Mauder, Ahlin, van den Heuvel/van Paradijs, Materne, Appenzeller/Mundt/Wolf, Houziaux, Rahe.

August: Rahe, Lauterborn, Breysacher/Muller/Schuster/West, Bergvall/Ekman/Lauberts/Westerlund, Surdej, Ahlin, Doazan.

Sept.: Doazan, Collin-Souffrin, Heidmann, Wamsteker, Metz/Pöllitsch, Ahlin, Spite.

100-cm Photometric Telescope

April: Turon, Wamsteker/Schober, Danks/Shaver, Martel, Vogt, Knoechel.

May: Knoechel, Querci, de Loore, Schnur, Vogt, Pedersen.

June: Pedersen, Pakull, Breysacher/Muller/Schuster/West, Westerlund/Wlérick, Alcaíno, Wamsteker.

July: Wamsteker, Mauder, van den Heuvel/van Paradijs, Breysacher/Muller/Schuster/West, Schmidt-Kaler, Wamsteker, Stenholm.

August: Stenholm, Bergvall/Ekman/Lauberts/Westerlund, van Woerden/Danks, Schultz.

Sept.: Schultz, Wamsteker/Schober, Adam, Metz/Pöllitsch, Wamsteker, Wamsteker/Schober.

50-cm Photometric Telescope

April: Megessier, Geyer/Vogt, Lodén, Vogt.

May: Lodén, Knoechel, de Loore, Surdej, Wramdemark.

June: Wramdemark, Gahm, Pakull, Vogt, Elst.

July: Elst, Vogt/Maitzen, Rahe.

August: Rahe, Vogt, Lauterborn, Surdej, Wamsteker/Schober, Doazan.

Sept.: Doazan, Weiss, Spite, Wamsteker/Schober.

Objective Prism Astrograph (GPO)

April
to Sept: Blaauw/West, Muller/Schuster/Surdej/West.

60-cm Bochum Telescope

July: Pettersson, Appenzeller/Mundt/Wolf.

August: Pettersson, Reiss, Schober.

Sept.: Schober.

50-cm Danish Telescope

June: Loibl, Sterken.

July: Sterken, Heck, Renson.

Tentative Meeting Schedule

The following dates and locations have been reserved for meetings of the ESO Council and Committees:

March 2	Finance Committee, Garching
April 22	Committee of Council, Garching
May 9/10	*Joint meeting of Scientific Policy Committee and* Instrumentation Committee, Munich
May 12	Council, Munich
May 23–25	Observing Programmes Committee, Kiel