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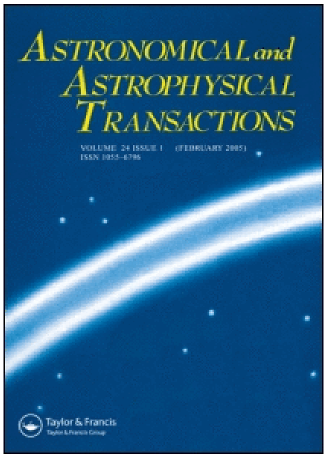

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The 2-d galaxy distribution near the galactic plane (120° ≤ **l** ≤ 130°, -10 ≤ **b** ≤ 10°)

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THE 2-D GALAXY DISTRIBUTION NEAR THE GALACTIC PLANE ($120° \leq l \leq 130°$, $-10 \leq b \leq +10°$)

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Here we present the results of a survey for galaxies in the region $120° \leq l \leq 130°$ and $-10° \leq b \leq +10°$ (galactic coordinates) on red-sensitive POSSI prints. The search resulted in the detection of altogether 1161 galaxy candidates, most of them identified for the first time. We were able to find two galaxy clusterings.

KEY WORDS Catalogs – (ISM): dust, extinction – Galaxy: structure – galaxies: clustering

1 INTRODUCTION

In 1934 Hubble coined the term Zone of Avoidance (ZoA) for the area of the sky where he found almost no galaxies due to the extinction by the dust in the Milky Way. In the early eighties extragalactic research in the ZoA began to gain importance concerning the question of nearby largescale structure. Since the ZoA covers about a quarter of the extragalactic sky it is likely that our knowledge of our extragalactic neighbourhood remains incomplete. One of the most intriguing questions in this context is whether structures already known from surveys at higher galactic latitudes continue through the ZoA or not. Furthermore, a as complete as possible inventory of the local galaxy population is needed in order to establish the true dynamics of the Local Group. Over the last decade a flourishing identification industry has led to the discovery of many thousands of mainly optically identified extragalactic objects.

2 MOTIVATION

The main reasons for selecting the area from $l = 120°$ to $130°$ and from $b = -10°$ to $+10°$ were as given below.

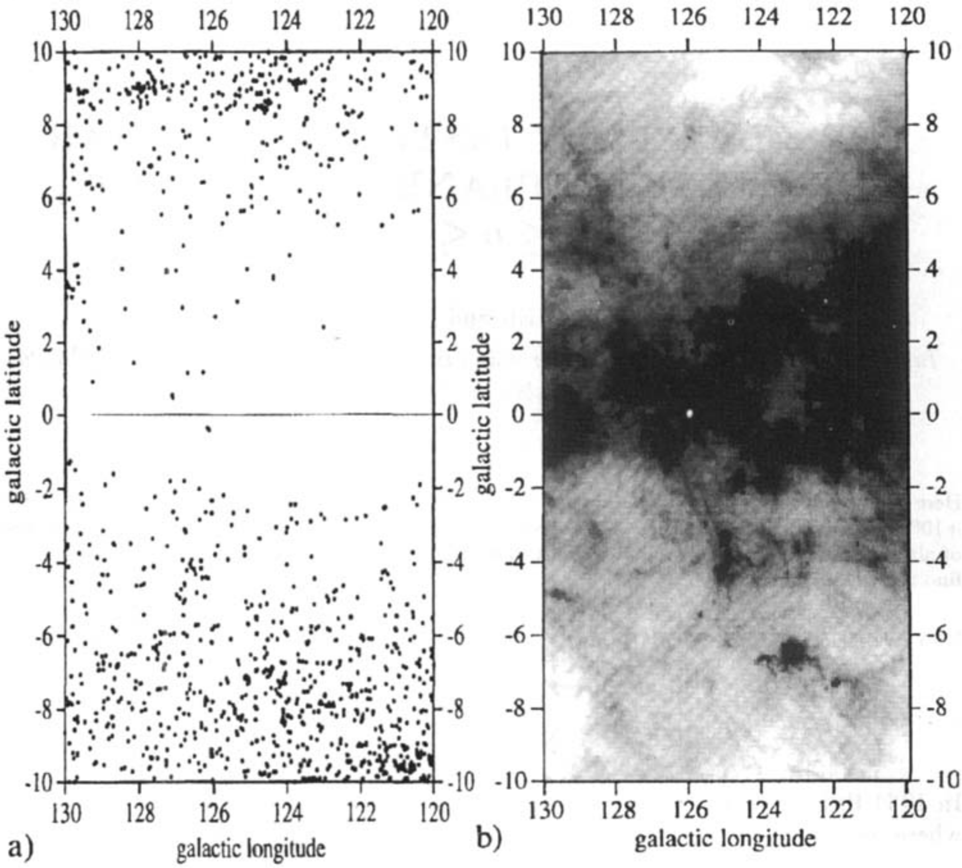

Figure 1 *a*, The observed galaxy distribution in galactic coordinates. *b*, The 100 μm ISSA sky brightness image. Pixels in *b* correspond to 4 × 4 arcmin^2. Pixels with lowest 100 μm intensities are white, those with highest ones black.

(1) The region is in the second galactic quadrant, where a statistically relevant but not too large galaxy sample can be expected.

(2) The famous Maffei galaxies (Maffei 1 and 2) are located only a few degrees away; therefore, other nearby object(s) might be detectable (this assumption has meanwhile be proven by the discovery of two nearby galaxies: a massive one — see Kraan–Korteweg *et al.* (1994), and this massive object plus a dwarf irregular — see Huchtmeier *et al.* (1995). In addition McCall and Buta (1995) reported the detection of another two dwarf companions of Maffei 1).

(3) The region is free of large extended emission nebulae or dust clouds.

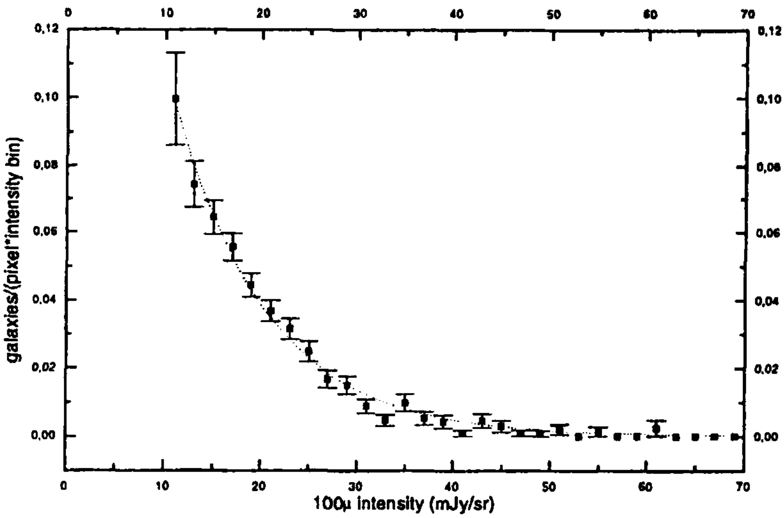

Figure 2 Squares: the number of galaxies per pixel and intensity bin of Figure 1*b*, plotted versus the corresponding 100 μm intensity. The dotted line represents the fit used to calculate the expected galaxy density.

3 THE DISTRIBUTION OF GALAXIES

Figure 1*a* shows the 2-D galaxy distribution as found in our optical survey. In addition to a clear decline in galaxies within the innermost ±5° of the area and an easily recognizable east–west asymmetry which can be understood, e.g. ising the extinction catalogue of Neckel and Klare (1980) or the catalogue of dark clouds of Lynds (1968), four small-scaled density enhancements are visible. They are centred at $(l, b) = (128.0, 8.9)$ (Candidate I), (124.5, 8.6) (II), (129.9, 3.6) (III) and (120.5, –9.5) (IV). The nature of these four overdensities is not clear and each of them has to be investigated in detail in order to decide whether they are indeed physical groupings or just caused by local lows in extinction.

The IRAS Sky Survey Atlas (Wheelock *et al.*, 1993) provides sky brightness images in the 12, 25, 60 and 100 μm IRAS bands. The 60 and 100 μm images can be used as a means for discussing the distribution of the IR emitting dust (see e.g. Wakamatsu *et al.*, 1994). Figure 1*b* shows the sky surface brightness of the surveyed region at 100 μm.

Squares in Figure 2 show the resulting galaxies per pixel and 100 μm intensity Figure 1*b*. One notices a clear correlation between galaxy density and 100 μm intensity. We interpret this result as showing that 100 μm IRAS sky brightness maps trace the 2-D dust distribution in the galactic plane sufficiently well.

Figure 3*a* shows density plots of the galaxy distribution in the general area of clustering candidate I. Densities were determined by counting galaxies within 1 □° cells (except at the boundaries) with Candidate I located in the centre of its corre-

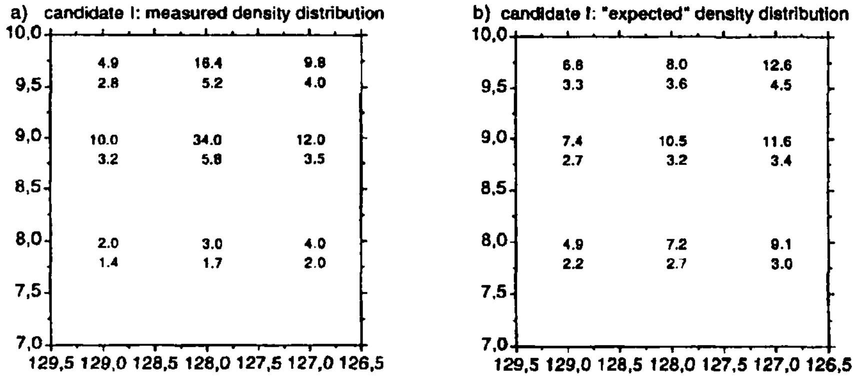

Figure 3 *a*, The galaxy density in a 3 × 3□° area with Candidate I in the centre. *b*, The corresponding expected galaxy density.

sponding cell. Upper numbers in each cell are the galaxy densities within this cell, lower numbers are the corresponding errors ($\sqrt{N}$). To decide whether Candidate I is a real overdensity or caused by low extinction, we fitted an $A \exp[-B\, x]$ law to the data of Figure 2 (dotted line) and calculated an expected number of galaxies for each density cell. Figure 3*b* shows these expected density plots. The meaning of the numbers is the same as above. For holes in the dust layer these expected galaxy densities should be similar to the measured ones. For real clusterings they should be much smaller.

Comparison of Figure 3*a* and Figure 3*b* suggests that Candidate I is indeed a real overdensity. We carried out a similar procedure for candidates II–IV. Candidate II turned out to be of small statistical relevance. However, it cannot be ruled out that it is indeed real as the same test using smaller cells when calculating the galaxy densities showed that the difference between measured and expected values increased. Candidates III and IV seem to be real groupings.

One has, however, to take care of the fact, that the quality of different POSS prints differ by as much as 0.5^m. The fit we are using to calculate the expected galaxy densities therefore corresponds to a mean print quality. Relative to this mean, Candidate IV is located on a high-quality print and we are therefore underestimating the expected densities in the general area of Candidate IV. In addition, Candidate IV is located close to the edge of the survey field. These points together make the nature of Candidate IV somewhat uncertain, although it has a large difference compared with the expected densities.

In order to confirm or dismiss our findings, radial-velocity measurements are needed for all four candidates.

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