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A BIBLIOGRAPHY OF PAPERS ON THE DIFFUSE INTERSTELLAR BANDS

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ABSTRACT. We present a compilation of publications on the diffuse interstellar bands, found in the literature dating back to the first known mention of the bands. We have attempted to make this list complete, but recognize that some papers may have eluded us. Judgement was required in some cases where the diffuse bands are mentioned but are not a central theme of a paper; in most instances we kept such papers in our list, rather than omitting them.

1. INTRODUCTION

The diffuse interstellar bands have been largely a curiosity, as opposed to a legitimate area of astrophysical research, for most of the more than 70 years since they were first mentioned in the literature (Heger 1922). Only in the past thirty years or so have the features begun to attract serious attention, and only in the past decade or less has the problem of their identification become recognized as potentially important for other areas of astrophysics or chemistry.

The recent conference on the diffuse interstellar bands, held in Boulder, Colorado, May 16-19, 1994, provided an opportunity for researchers interested in the diffuse band problem to come together and compare data and hypotheses. Through this interaction, and through the observation that many scientists, particularly chemists, are now becoming active in diffuse band research but lack a broad background in the astronomical literature on the diffuse bands, it appears useful to provide an updated and complete bibliography of publications in which the diffuse bands are discussed. This paper is an attempt to provide such a bibliography.

2. SELECTION OF REFERENCES

In choosing papers to be included in the bibliography, we necessarily had to be somewhat subjective, particularly when considering papers that make only passing references to the diffuse bands, as opposed to those devoted to the bands as their primary topic. In general we tended to err on the side of inclusion of a paper when in doubt, with the result that some of the papers in the list are aimed at quite different objectives than solving the diffuse band problem. But all of the papers listed do include some mention or discussion of the features. Some of the older papers listed

have only minor mention of the diffuse bands, but in many cases these are very interesting and significant, nevertheless. For example, Henry Norris Russell (1935) devotes only a sentence or two to the diffuse bands in his treatise on astronomical spectroscopy, but is later credited by people such as Swings (1937) for the assertion that the source of the bands must be molecular. Similarly, Herbig (1966), in a paper on FU Orionis, mentions the diffuse bands in the context of their weakness relative to extinction; this may be the first statement in the literature pointing out that the diffuse bands are not seen in circumstellar environments, something that was rediscovered by Snow and Wallerstein (1972) a few years later.

The first known reference to the diffuse bands in the literature is that of Heger (1922), who lists the 5780 and 5797Å bands as possibly stationary. This mention appears in a table of stellar spectral features. Heger also cites an earlier paper on the Wolf-Rayet star γ^2 Velorum as showing dark lines that coincide approximately with these two bands, so it might be tempting to cite this paper (in 1897, in the *Annals of the Harvard College Observatory*) as the true first reference to the diffuse bands. But according to Herbig (1994; private communication), who has reviewed the 1897 paper, the dark bands seen in the spectrum of γ^2 Velorum are actually due to the complex structure of the stellar emission lines, and are not diffuse interstellar bands. Therefore, unless something further is brought to our attention, we conclude that the 1922 paper by Heger represents the first mention in the literature of the diffuse interstellar bands.

In our listing we have excluded papers that discuss the 2175Å ultraviolet extinction bump (unless they also mention the diffuse bands), on the grounds that this feature is generally considered to be a distinct phenomenon, and that there is now a growing consensus that the UV feature and the diffuse bands arise from different sources (see the paper by Mathis in the Proceedings of the Diffuse Interstellar Bands conference, to appear in 1995). Similarly, we have excluded papers on such candidate species as polycyclic aromatic hydrocarbons (PAHs) and fullerenes such as C₆₀, unless they specifically include discussion of the possible role of these molecules as diffuse band carriers.

The citations given below were gleaned from: (1) the reference lists of recent publications on the diffuse bands, and the reference lists of the cited papers, and so on; (2) solicitation of input from attendees at the Diffuse Interstellar Bands conference; (3) the extensive list of references provided to us by George Herbig, taken from his review of the diffuse band problem, soon to be published in *Annual Reviews of Astronomy and Astrophysics*; and (4) the *Astronomy and Astrophysics Abstracts* series, which began in 1969. Nevertheless, notwithstanding our immense efforts to be complete, there is a possibility, if not a certainty, that we have missed some papers that should be included. We are planning to maintain an updated version of this bibliography, and therefore we ask that anyone who has information about references that we have omitted contact us and provide the missing data.

In general we are *not* including papers published by abstract alone, nor are we including doctoral dissertations, on the basis that in both cases the reference is not useful unless the completed study is published in the literature that is generally available. There are a few exceptions to this (i.e. a few cases where abstract citations are included), where the information seemed especially useful or was not available elsewhere. On the other hand, we are including, where available, citations from relatively obscure publications such as various observatory reports or conference proceedings.

In most cases we have included the full title of the paper as well as the literature citation. However, with some of the older papers we were unable to accomplish this before the publication deadline.

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