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SPECTRAL TYPES OF LONG-PERIOD VARIABLES
IN SAGITTARIUS

137 previously discovered long-period variable stars have been classified spectroscopically using plates obtained with the Warner and Swasey Observatory Schmidt telescope and a four-degree objective prism producing a dispersion of 1700 Å/mm. The Kodak IN plates plus RG8 filter used cover the wavelength range 6800-8800 Å. All the stars are in Harvard Variable Star Field 193 in Sagittarius centered at $18^{\text{h}}23^{\text{m}}$, -23° . The variables were classified on the Case system as described by Nassau and Velghe (1), and the resulting Case spectral subtypes were adjusted to the Mt. Wilson system using the relation derived by Blanco (2). Approximately half of the types listed are based on only one spectral classification. The number of plates on which the star was classified is given in column 5 of the tables. When subtypes obtained from two or more plates differ significantly, both are given, separated by a dash. The approximate standard error of a single spectral classification is .8 subtypes for classes earlier than M6 and .4 subtypes for classes M6 and later (3).

It has been shown (3) that larger-amplitude, long-period variables undergo spectral variations with phase amounting to several subtypes. The spectral type at maximum light would be most valuable for statistical studies, but in the case of these stars the data available were insufficient for this to be achieved. Therefore it should be kept in mind that all the spectral types listed below were obtained at unknown phases.

Table 1 contains data for variables which already have a variable star designation in the General Catalogue of Variable Stars (4). Stars listed in Table 2 do not yet have a variable star designation, and each is designated by the number it was assigned in the paper listed in the reference column.

TABLE 1

Var. Star Designation	Coordinates (1900) R. A. 18 ^h Dec.		Spectral Type	No. of Plates	Reference No.
V1837 Sgr	10 ^m 02 ^s	-27°24'9	M5	1	10
V1845 Sgr	12 05	-24 51.2	M7	2	9
V1649 Sgr	12 09	-24 00.4	M8	1	8
V506 Sgr	12 09	-25 43.7	M7	1	6
V507 Sgr	12 18	-25 54.8	M5-6	2	6
V1852 Sgr	13 11	-24 08.5	M6-8	2	10
V510 Sgr	14 14	-26 03.7	M7	1	6
V1650 Sgr	15 16	-23 17.6	M3-8	2	8
V511 Sgr	15 39	-25 04.1	M1-5	3	6
V1862 Sgr	15 42	-27 28.1	M4	1	10
V1652 Sgr	15 53	-26 41.7	M3-5	2	8
V512 Sgr	15 54	-26 06.9	M3-6	2	6
V1653 Sgr	15 56	-26 33.0	M7	1	8
GO Sgr	16 03	-25 57.8	M7-8	2	12
GQ Sgr	16 33	-24 56.3	M4	2	13
V1868 Sgr	17 06	-24 40.2	M5:-7	2	10
V513 Sgr	17 42	-25 34.5	M3	1	6
V514 Sgr	18 08	-25 56.3	M4	2	6
V1655 Sgr	18 26	-25 04.2	M6-7	2	8
V1657 Sgr	18 59	-23 09.2	M2	2	8
V515 Sgr	19 06	-25 28.9	M7	2	8
GY Sgr	19 23	-27 28.1	M4	1	10
GZ Sgr	19 29	-23 48.1	M7	1	13
V1659 Sgr	20 06	-22 30.7	M5-6	2	8
HK Sgr	20 06	-24 42.2	M7-8	3	12

table 1 continued

Var. Star Designation	Coordinates (1900)		Spectral Type	No. of Plates	Reference No.
	R. A. 18 ^h	Dec.			
V1877 Sgr	20 ^m 14 ^s	-23 ^o 56'.9	M7	1	9
HO Sgr	20 45	-25 44.2	M10	2	13
V1661 Sgr	20 59	-21 11.7	M8	2	8
V517 Sgr	21 34	-26 00.0	M7	1	6
V518 Sgr	21 48	-26 21.2	M6	1	6
V519 Sgr	21 49	-26 00.1	M8	1	6
HT Sgr	22 12	-25 44.7	M4-8	2	13
V520 Sgr	22 18	-25 51.4	M5-8	2	6
V1664 Sgr	22 20	-24 55.8	M3:	1	8
V1890 Sgr	22 52	-27 06.1	M4	1	10
HU Sgr	22 54	-25 08.3	M7	2	12
V1666 Sgr	23 03	-25 04.7	M4-6:	2	8
V1667 Sgr	23 18	-24 58.8	M6-8	2	8
HV Sgr	23 28	-26 30.5	M2	1	10
V1891 Sgr	24 01	-24 19.5	M7-8	3	9
V1669 Sgr	24 13	-25 09.5	M3	1	8
V1672 Sgr	24 37	-21 14.8	M4	2	8
V1673 Sgr	25 06	-25 20.1	M7	1	8
V1674 Sgr	25 11	-25 09.4	M8	1	8
IK Sgr	25 24	-24 51.9	M7	1	9
V1676 Sgr	25 36	-23 48.9	M7	2	8
V1677 Sgr	25 38	-22 47.9	M7	3	8
IL Sgr	25 39	-25 43.7	M2	1	12
V1678 Sgr	25 52	-22 26.2	M7	2	8
IM Sgr	25 53	-25 17.6	M9	1	4
V1900 Sgr	26 01	-24 50.9	M3	2	9

table 1 continued

Var. Star Designation	Coordinates (1900) R. A. 18 ^h Dec.		Spectral Type	No. of Plates	Reference No.
V1902 Sgr	26 ^m 16	-24 ^o 53.8	M7	1	10
V1680 Sgr	26 22	-23 20.5	M4	1	8
LS Sgr	26 25	-25 34.9	M7	2	10
V1681 Sgr	26 38	-23 41.8	M5-8	2	8
LT Sgr	26 40	-25 22.3	M3	1	10
V1682 Sgr	26 44	-23 55.6	M5-7	3	8
IP Sgr	26 51	-26 39.5	M3	1	13
V1683 Sgr	27 05	-20 59.0	M7	1	8
V1684 Sgr	27 05	-25 10.4	M7	1	8
IQ Sgr	27 16	-25 10.8	M7-8	3	8
V1904 Sgr	27 17	-24 09.8	M5	3	9
V1685 Sgr	27 23	-20 43.9	M5:	1	8
IS Sgr	27 39	-25 13.6	M8-9	2	10
V1907 Sgr	27 49	-20 17.4	M7	1	10
LU Sgr	27 51	-25 37.9	M9	2	10
V1687 Sgr	27 55	-20 53.8	M4	1	8
V1908 Sgr	27 59	-24 57.6	M7	2	9
V1688 Sgr	28 30	-23 32.4	M8	2	8
V1910 Sgr	28 42	-27 06.0	M6:	1	10
V1690 Sgr	28 50	-21 20.2	M7	2	8
V1691 Sgr	28 51	-22 09.8	M8	2	8
V1913 Sgr	28 56	-26 45.4	M7	1	10
V1692 Sgr	29 08	-19 21.2	M9	1	8
V1914 Sgr	29 12	-22 20.5	M4	2	9
V1693 Sgr	29 14	-19 12.7	M4	2	8

table 1 concluded

Var. Star Designation	Coordinates (1900)		Spectral Type	No. of Plates	Reference No.
	R. A. 18 ⁿ	Dec.			
V1694 Sgr	29 ^m 15 ^s	-21 ^o 41'.4	M5-7	2	8
IV Sgr	29 29	-24 13.9	non-M	2	12
V1696 Sgr	29 42	-25 20.3	M5-7	2	8
V1697 Sgr	30 01	-22 12.1	M6	2	8
IZ Sgr	30 33	-21 04.0	M6	2	13
V1699 Sgr	30 50	-22 37.1	M3	1	8
V1700 Sgr	31 15	-21 23.8	M4	2	8
V1917 Sgr	31 31	-20 16.8	M5	1	10
V1918 Sgr	31 37	-20 58.3	M7:	1	11
BT Sgr	31 37	-24 35.5	M6	2	5
V1701 Sgr	31 43	-24 32.6	M6-7	2	8
KL Sgr	31 57	-23 59.2	M5	1	10
V1920 Sgr	32 20	-20 35.4	M2	1	9
KM Sgr	32 43	-23 58.1	M7	1	12
V1702 Sgr	33 05	-20 48.8	M6	1	8
V1922 Sgr	33 05	-25 22.3	M8	2	10
V1923 Sgr	33 30	-25 07.7	M3	1	10
KN Sgr	33 32	-25 00.4	M4-8	2	15
V1703 Sgr	34 25	-18 48.8	M6	1	8
V1704 Sgr	34 27	-20 54.3	M7	1	8
V1926 Sgr	35 18	-24 04.0	M8	1	10
V1705 Sgr	35 19	-19 26.8	M5	1	8
V1706 Sgr	35 24	-19 48.7	M7:	1	8
V1707 Sgr	35 58	-20 15.5	M2	1	8
V1927 Sgr	36 08	-22 35.8	M7	1	9
V1929 Sgr	36 22	-25 22.2	M5	1	10

TABLE 2

Variable Star No.	Coordinates (1900)		Spectral Type	No. of Plates	Reference No.
	R. A. 18 ^h	Dec.			
2	07 ^m 44 ^s	-27 ^o 32' 0	M4	1	13
5	14 07	-23 32.3	M7	2	13
3	18 18	-22 54.0	M7	1	18
4	18 25	-23 50.0	M4	1	17
4	18 37	-23 22.9	M7	2	18
8	20 03	-19 44.8	M6	1	15
9	20 15	-21 53.6	M6	4	13
6	20 45	-22 49.5	M8	1	17
7	20 48	-21 10.9	M6	2	17
6	22 27	-23 16.6	M4-7	2	18
8	22 45	-25 51.6	M6	1	17
5	23 11	-21 40.1	M4-7	3	14
7	23 12	-22 06.3	M7	1	18
9	23 20	-24 27.9	M5	1	17
16	23 48	-19 07.8	M7	1	13
11	24 26	-22 27.6	M3	1	17
12	24 38	-23 42.5	M5-6	2	17
4	24 43	-22 01.8	M7	3	16
4	24 45	-23 09.7	M7	1	19
10	25 27	-22 39.5	M2	1	15
14	26 31	-23 18.6	M7	2	17
22	26 35	-22 17.8	M7	1	13
6	27 14	-22 56.5	M7	1	16
15	28 02	-24 29.9	M7	3	17
16	28 45	-23 57.6	M7	3	17
26	29 33	-21 07.8	M4	2	13

table 2 concluded

Variable Star No.	Coordinates (1900)		Spectral Type	No. of Plates	Reference No.
	R. A. 18 ^h	Dec.			
30	30 ^m 59 ^s	-26 ^o 15'.6	M7	1	13
HV9486 ⁺	31 56	-27 03.7	M7	1	12
20	32 14	-25 38.2	M6	3	17
21	32 41	-23 10.7	M5	2	17
32	34 27	-24 07.6	M7	1	13
16	35 01	-25 34.9	M6	1	15
9	35 07	-24 07.8	M7	1	14
23	35 16	-25 49.2	M5	1	17
10	36 26	-26 20.2	M3	1	14

+ HV9486 = 4249 in the Catalogue of Stars Suspected of Variability (7)

Some of the classifications were made during work on a doctoral thesis at Case Institute of Technology. The others were made while I was at the Maria Mitchell Observatory in August, 1967. In all cases, identification charts were provided by Dr. Hoffleit.

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