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The Spectrum of a Bright Perseid

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A spectrum of one bright Perseid was accidentally obtained on 10 August 1975. The authors present here the list (Table 1) of the features found in this spectrum.

Спектр яркой Персеиды. — Дня 10-ого августа 1975 г. был случайно получен спектр яркой Персеиды. В таблице 1 приведен список спектральных линий, наиденых в спектре и их отождествление.

Spektrum jasné Perseidy. — Dne 10. srpna 1975 bylo náhodně exponováno spektrum jedné Perseidy. V tabulce 1 je uveden seznam čar, které byly ve spektru nalezeny.

On one of the negatives exposed during the spectrophotographic observation of the comet Kobayashi-Berger-Milon 1975 IX at the Kleť Observatory one spectrum of a relatively bright meteor was also obtained accidentally. The negative was exposed on August 10, 1975 between $20^h36^m05^s$ and $20^h57^m20^s$ U.T. with the small Schmidt camera (200/150 mm, f/3) on the ORWO NP 27 film. The 7° objective prism was used. The spectral range covered is about 370 to 660 nm.

The meteor was not observed visually. Its magnitude estimated from the negative may be $\sim(-4 \pm 1)^m$, the length of its trail being 2.8°. The coordinates (1950.0) for the beginning of the path (on the edge of the negative) were

$$\alpha_b = 11^h50.1^m \qquad \delta_b = +50°25'$$

and for the end of the trail

$$\alpha_e = 11^h57.1^m \qquad \delta_e = +47°52' .$$

It is evident that the meteor was the Perseid because its path intersects the apparent radiant of Perseids for the night August 10/11, 1975 almost exactly. The height of the meteor above the Earth's surface, in which the spectrum was obtained, was probably in the range between 80 and 100 km.

The spectrum (class *Y* in Millman's classification scheme) showed that the geocentric velocity of the meteor was very high, probably $v > 50$ km s^{-1}. For those meteors the strong line of Mg II ($\lambda = 448.1$ nm) and the bright features of the

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Table 1

Measured wavelength (nm)	Laboratory wavelength (nm)	Atom (Ion) Molecule	Multiplet (No.)	Measured wavelength (nm)	Laboratory wavelength (nm)	Atom (Ion) Molecule	Multiplet (No.)
379.5	379.4	Fe I	21	427.5	427.1	Fe I	152
382.0	382.1	Fe I	20		427.3	Fe I	42
382.5	382.4	Fe I	4	430.5	430.8	Fe I	42
	382.6	Fe I	20	432.5	432.6	Fe I	42
382.7*	382.8	Fe I	45	438	437.6	Fe I	2
383.0*	382.9	Mg I	3	448*	448.1	Mg II	4
383.5	383.4	Fe I	20		448.2	Fe I	2
384.0	383.9	Mg I	3	452.5	452.9	Fe I	68
	384.0	Fe I	20	455	454.7	Fe I	39
	384.1	Fe I	45		454.8	Fe I	755
385.5	385.6	Fe I	4	458	458.1	Ca I	23
386.0	386.0	Fe I	4		458.2	Fe I	555
387.0	387.2	Fe I	20		458.4	Fe I	38
387.5*	387.8	Fe I	20	460.5	460.1	Cr I	21
388	387.9	Fe I	4		460.3	Fe I	39
	388.0	CN		470	470.3	Mg I	11
	388.2	CN			470.4	Ni I	133
388.5	388.6	Fe I	4	473.5	473.7	Fe I	554
390	390.1	Fe I	45	479	478.6	Ni I	98
392*	392.0	Fe I	4		478.7	Fe I	467
	392.3	Fe I	4		478.9	Fe I	588
393.5*	393.4	Ca II	1		478.9	Cr I	31
394.5	394.4	Al I	1		479.0	Fe I	753
396	396.2	Al I	1	482.5*	482.4	Mn I	16
397*	396.8	Ca II	1	486	486.0	Fe I	318
398.5	398.4	Fe I	277	490	489.1	Fe I	318
400*	399.7	Fe I	278		489.2	Fe I	318
	399.8	Fe I	276	502?	501.2	Fe I	16
401	400.5	Fe I	43	510?	511.0	Fe I	1
403	403.1	Mn I	2	512	512.2	Fe I	1095
	403.3	Mn I	2		512.4	Fe I	16
	403.4	Mn I	2		512.5	Fe I	1090
405*	404.6	Fe I	43		512.7	Fe I	16
406	406.4	Fe I	43		512.8	C_2	
407	407.2	Fe I	43	520	520.4	Cr I	7
411*	410.8	Fe I	354		520.5	Fe I	1
	411.0	Fe I	357		520.6	Cr I	7
414	414.4	Fe I	43	525	524.7	Fe I	1
417.5	417.3	Fe I	19		524.8	Co I	39
	417.4	Fe I	19		525.0	Fe I	1
419?	418.5	Fe I	355		525.1	Fe I	66
422.5	422.7	Ca I	2		525.4	Fe I	553

Mesured wavelength (nm)	Laboratory wave-length (nm)	Atom (Ion) Molecule	Multiplet (No.)	Measured wavelength (nm)	Laboratory wave-length (nm)	Atom (Ion) Molecule	Multiplet (No.)
525	525.5	Fe I	1	602*+	602.2	Mn I	27
527*	526.9	Fe I	15		602.4	Fe I	1178
531*	530.6	N_2		606*+	606.6	Fe I	207
	530.7	Fe I	36	616*+	615.5	O I	10
546*	545.6	Fe I	15	636*+	634.9	Si II	2
	545.8	Mn I	4		637.1	Si II	2
559*	558.7	Fe I	686	640*+	639.4	Fe I	168
	558.9	Ca I	21		640.0	Fe I	816
561*	561.6	Fe I	686		640.0	Fe I	13
563*	563.8	Fe I	1087	650+	649.1	Ni I	21
570*	568.8	Na I	6		649.2	Mn I	39
590*	589.0	Na I	1		649.4	Ca I	18
	589.6	Na I	1		649.5	Fe I	168
602*+	602.2	Fe I	60 etc.				

Notes: * very bright feature, ? identification uncertain, + blended by very strong N_2 bands

Na I dublet ($\lambda\lambda$ 589.0 + 589.6 nm) are typical, which is in good agreement with the spectrum obtained.

The spectrum of the meteor was measured with the registering microphotometer by Zeiss and in the tracings features were identified the list of which is contained in Table 1. The identifications of the features were made according to Ceplecha [1].

Most features in the spectrum belong, however, to the multiplets of Fe I. Some of these features are very bright, especially the following: $\lambda\lambda$ 382.8, 387.8, 392.0, 399.7 + 399.8, 404.6, 410.8, 561.6, 563.8, 606.6 and 639.4 nm. Very bright features are also the Mg I (λ 382.9 nm), the Mn I ($\lambda\lambda$ 482.4, 545.8 and 602.2 nm) and the Ca I (λ 558.9 nm) lines. In the blue-violet part of the spectrum the strongest features are the Mg II (λ 448.1 nm) and Ca II ($\lambda\lambda$ 393.4 and 396.8 nm) lines, in the long wave part the Na I lines ($\lambda\lambda$ 568.8 and especially the dublet 589.0 + 589.6 nm), further the Si II features ($\lambda\lambda$ 634.9 and 637.1 nm), the O I line (λ 615.5 nm) and especially the atmospherical N_2 bands ($\lambda\lambda$ 530.6 and those between 600 and 660 nm) are very bright. The N_2 bands in the long wave part of the spectrum are the strongest features here and they blend some other lines.

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Reference

[1] Ceplecha Z.: Bull. Astr. Inst. Czech. 22, 219 (1971).