COMMON ABSORPTION LINES IN TWO QUASARS

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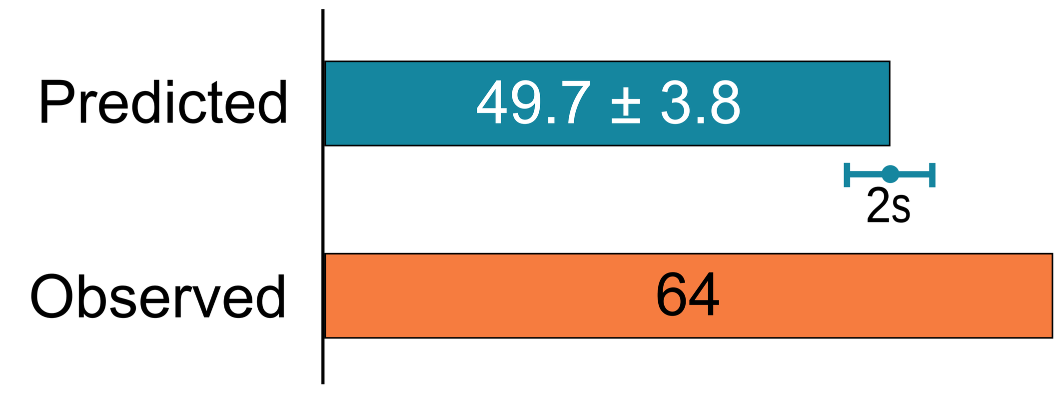
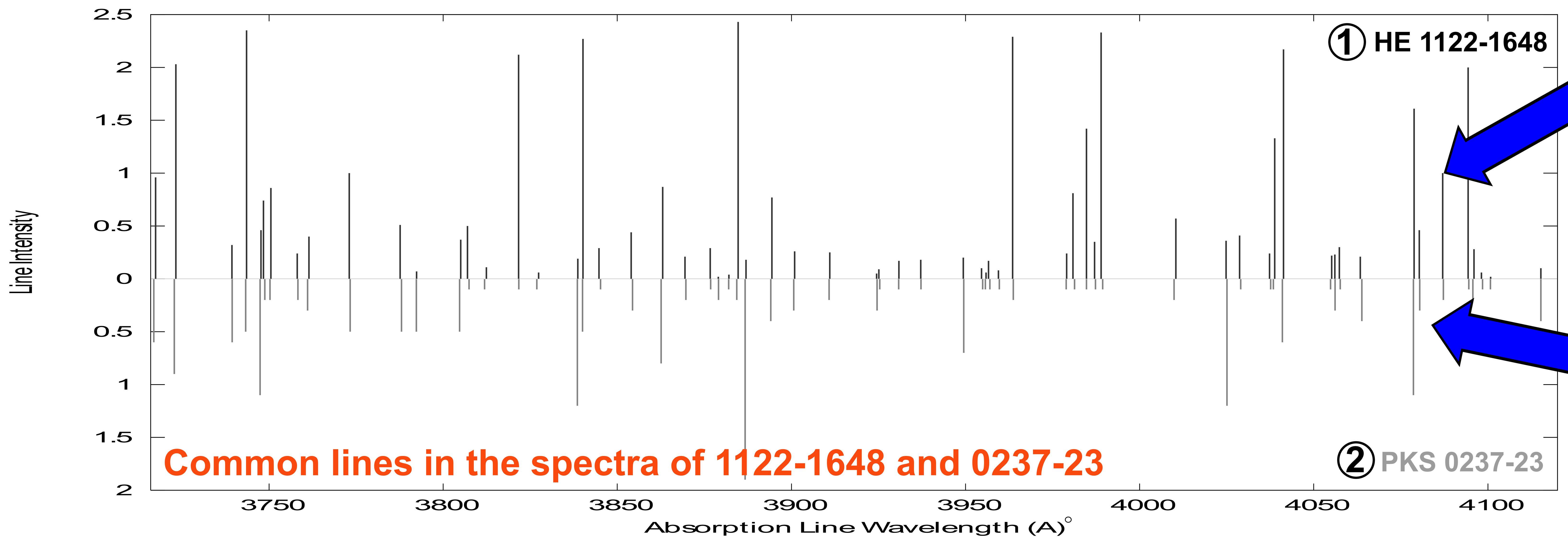
ABSTRACT

Quasars 0237-233 and HE 1122-1648 share more absorption lines in the observed frame (earth frame) than predicted by theory. We find 64 spectral lines in the interval 3716-4116 Å whereas the expected number is 49.7 ± 3.8 by chance-coincidence.

NUMBER OF MATCHING LINES





DATA SOURCES

Quasar ① HE 1122-1648

$11^h24^m42.8^s$ -17°05'18.0"

Telescope: ESO 8.2 m KUEYEN

Instrument: UV and Visible Echelle Spectrograph

Rollinde et al. (2001) have obtained a high resolution and high S/N ratio spectrum of the quasar HE 1122-1628 (z=2.40)
They list 187 absorption lines in the wavelength interval 3679-4116 Å.

SKY SEPARATION: 117.6°

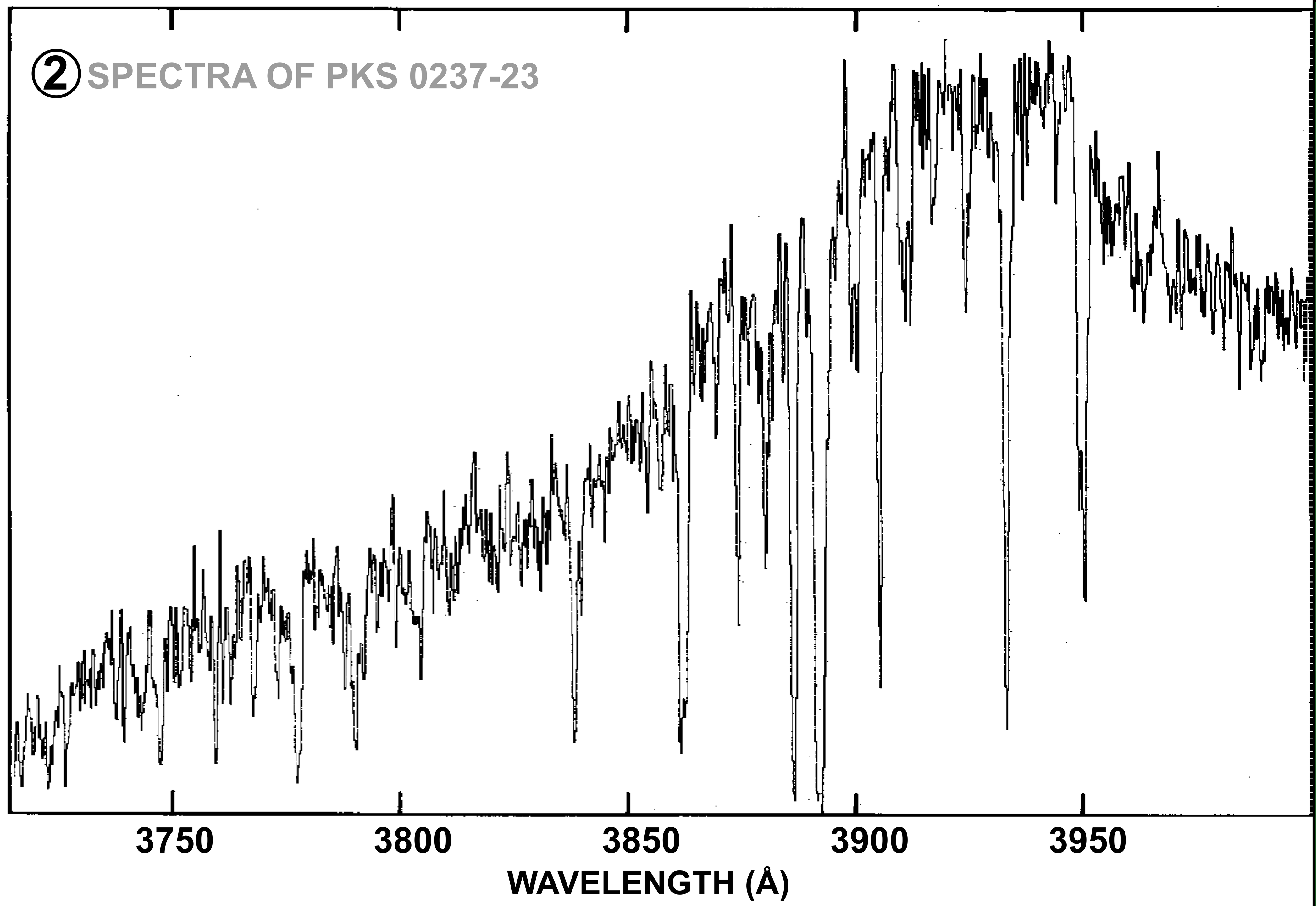
Quasar ② PKS 0237-23

$02^h40^m08.2^s$ -23°09'15.7"

Telescope: 5 m Palomar

Instrument: IPCS (Image photon counting system)

Boksenberg and Sargent (1975) obtained a spectrum of resolution 0.71 Å.
They give a list of 75 absorption lines in the wavelength range 3737-4270 Å.
Boroson et al. (1978, hereafter BSBC) carried out further observations and found wavelengths and equivalent widths (EW) of 193 absorption lines in the spectral range 3716-4289 Å.



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COMPARISON

For 0237-233, for the interval 3679-4116 Å the best available data appears to be that of BSBC. The common wavelength interval is however 3716-4116 Å. In this interval there are 140 lines in 0237-233 and 175 lines in 1122-1628. A comparison of the Rollinde et al. data with the BSBC data shows that if we allow the maximum difference between the two wavelengths of 0.5 Å, there are 64 common lines. These pairs of lines are those plots 1 and 2. Obviously the question arises of chance coincidences. Russell and Bowen (1929) did pioneer work on this question. Using their formulae, we find that the expected number of chance coincidences in our case is 49.7, and the probable error is 3.8. This clearly shows that these coincidences between the wavelength of lines are not chance coincidences, but have a physical reason.

CONCLUSION

These coincidences can be readily understood on the basis of the Plasma-Laser Star Theory (PLAST) (Varshni, Lam, Nasser 1975-1989). which is based on sound physical principles and does not need the assumption of redshifts. It provides satisfactory explanations of the various phenomena associated with quasars. In short, quasars are a special type of star in which laser action is responsible for the strength of the broad emission lines. Most of the observational evidence on quasars either supports our theory or else is consistent with it.

The assumption of the ejection of matter from quasars at high speed is supported from the fact that the widths of emission spectral lines observed in quasars are typically of the order of 2000 - 4000 km/sec. The ejected matter can form a nebulosity around the quasar or dissipate into space. Laser action is enhanced if the hot plasma contacts this colder gas.

If we consider two stars which belong to the same spectral class or to very neighbouring spectral classes, for example two A2 type stars or one A2 type star and the other A3 type star, then they have very many common absorption lines.

This arises because in the two cases the plasma where the absorption is occurring is very similar in the two cases. In our theory of quasars the absorption is occurring in the extended atmosphere of a star, much like a shell star. The coincidences between the wavelength of lines in 1122-1648 and 0237-233 is occurring because the shells of these two stars are quite similar.