A high positive correlation between the distance and temperature of the hottest nearby space objects

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A high positive correlation between the distance and temperature of the hottest nearby space objects

Bahram Kalhor¹, Farzaneh Mehrparvar², Behnam Kalhor³

Abstract

The paper uses the distance and temperature of 47,111 hottest nearby space objects including stars, quasars, white dwarf, and carbon stars. We have used SIMBAD Astronomical Database and obtained this information from 930,000 records. The range of temperature of the hottest objects is between 6158 and 99,575 K. Also, the distance of the objects is between 231.7375 and 1 (mas). We report the correlation between the distance and temperature of these hot objects at the temperature upper than 6632 K is equal to 0.135063 and will be increased to 0.32001 at temperatures upper than 9860 K. Also, the correlation between the temperature and distance of objects hotter than 12,000 K is equal to 0.270218.

Keywords: distance, temperature, correlation, star, space

Introduction

Recently, we have reported a positive correlation (0.914384) between the possibility of finding unexpected high Redshift (Z greater than 0.001) and the average temperature of nearby objects in different categories [1]. By analyzing information of 199 high Redshift nearby objects we realized that most of them are quasar and white dwarf, and an average temperature of them is almost 9,771 K. The SIMBAD Astronomical Database told us "some of them showed up as stars in SDSS imaging data because they look like point sources, but they were followed up for spectra so that we can tell that they are actually quasars. The stars have Redshifts near zero and the quasars have Redshift values in the expected range". Hence, we decided to find the correlation between distance and temperature of hottest objects.

We obtained more than 930,000 records of hottest objects from the SIMBAD Astronomical Database and wrote a program for deleting repeated data. Finally, information of 47,111 hottest objects retrieved, including stars, quasars, white dwarf, and carbon stars. The distances of the objects are between 231.7375 and 1 (mas), and objects with redshift less than zero have been excluded.

Normally we do not expect to find a significant relationship between the distance of our nearby space objects and their temperature. The first results did not show a significant positive correlation of all objects with different temperatures, but after choosing objects with high temperatures, we found a significant positive correlation between temperature and distance of the hottest nearby space objects.

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This paper is a statistical report, and we do not try to explain the reasons for this high correlation.

Histogram

In the SIMBAD Astronomical Database, the total number of the nearby space objects (distance less than 1 mas) with a temperature higher than 6158 K is equal to 47,111. The SIMBAD Astronomical Database uses the Parallax method to obtain the distance of the space objects. Hence, we could expect precise distance of objects.

Table.1 shows the top hottest space objects and their distance. Most of them are quasars, white dwarf, and carbon stars.

Table.1: Top hottest nearby space objects

Star Name	Temperature	Parallax (mas)
SDSS J092651.43+254859.0	99575	1.5027
SDSS J145545.58+041508.6	99575	1.658
2QZ J133710.1-002644	95733.5	3.1521
SDSS J132858.19+590851.0	94514.5	6.6602
SDSS J200646.50-124410.9	93374.5	1.1089
NGC 4688	89520	1.7841
SDSS J211607.27+004503.2	88852.5	3.9088
SDSS J222203.33-003138.1	88434	1.4757
SDSS J100612.78+252833.6	87287.5	2.4609
SDSS J161613.09+252012.6	86556	1.5088
KUV 03459+0037	86359	2.5214
SH 2-216	84990	7.9404
SDSS J160236.07+381950.5	82904.5	1.1114
PN A66 7	82710	2.0204
SDSS J082153.01+190659.1	82213.6666666667	1.1727
HZ 34	82188.3333333333	1.6505
Ton 309	82168.8333333333	2.9982
PB 7489	78839.1428571429	1.907
GD 524	78750	21.1885
SDSS J101700.39+190110.1	78197.5	1.1778
SDSS J105555.23+484739.8	77370	1.2227
PG 1543+454	77293.3333333333	2.0611
HD 223816	76690	6.5857
WD 2121-076	76624.2	2.3702
SDSS J074632.00+415210.2	76569.4	1.3487
CD-45 5058	75858	1.7077
SDSS J101619.80-020258.2	75536	2.8029
LB 651	75062.5	1.7978

Analyzing data of the hottest nearby objects shows that most of them are quasar, carbon star, or white dwarf. Hence, we will find the correlation between distance and temperature of them. Most of them have high redshift, and according to the SIMBAD Astronomical Database some of them showed up as stars in SDSS imaging data because they look like point sources

First, we present a histogram of the data. Regardless of the temperature of the space objects Fig.1 illustrates the histogram of them. The X-axis is the distance of the objects in the light year, and Y-axis is the number of space objects. Earth is in an arm of the Milky Way. Hence, by increasing the distance, the number of space objects will be decreased, because of going to the free space out of the arm.

Fig.1: Histogram of 47,111 hottest nearby space objects.

Fig.2: Histogram of 23,555 nearby space objects with temperature between 6155 and 6632 K.

Fig.3: Histogram of 23,556 nearby space objects with temperature higher than 6632 K.

Fig.2 and Fig.3 illustrate the histogram of the nearby objects in two different categories of temperatures. Fig.2 is a histogram of 23,555 objects with a temperature lower than 6632 K, and Fig.3 illustrates a histogram of the 23,556 objects hotter than 6632 K. The distribution of both categories is almost the same. Hence, we could not expect to find the different values of the correlation between distance and temperature of them.

Results

Firstly, we choose the biggest category, including all 47,111 space objects. The correlation between distance and temperature is equal to 0.076109063, which is almost zero. Secondly, we obtain the correlation between distance and temperature of the 23,555 objects with a temperature lower than 6632 K. The correlation between distance and temperature is equal to -0.03736, which is less than zero. After choosing a new category of the objects, including the 23,556 objects hotter than 6632 K, the correlation between distance and temperature will be obtained equal to 0.135063, which is higher than the colder category.

We have obtained the correlation between distance and temperature for new categories, including hotter space objects. Table.2 illustrates the relationship between the distance and temperature of the nearby objects. The correlation between distance and temperature of the space objects hotter than 9860 K is equal to 0.32001.

Table.2: Correlation between distance and temperature

Temperature (K)	Number of objects	Correlation between distance and temperature
Greater than 6158	47,111	0.076109063
Between 6158 and 6632	23,555	-0.03736
Greater than 6632	23,556	0.135063
Greater than 9860	8,924	0.32001
Greater than 12000	7,027	0.270218
Greater than 15000	4,882	0.194355

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Figures

Figure 1

Histogram of 47,111 hottest nearby space objects.

Figure 2

Histogram of 23,555 nearby space objects with temperature between 6155 and 6632 K.

Figure 3

Histogram of 23,556 nearby space objects with temperature higher than 6632 K.