Analysis of the stellar parameters based on the LAMOST-K2 project data

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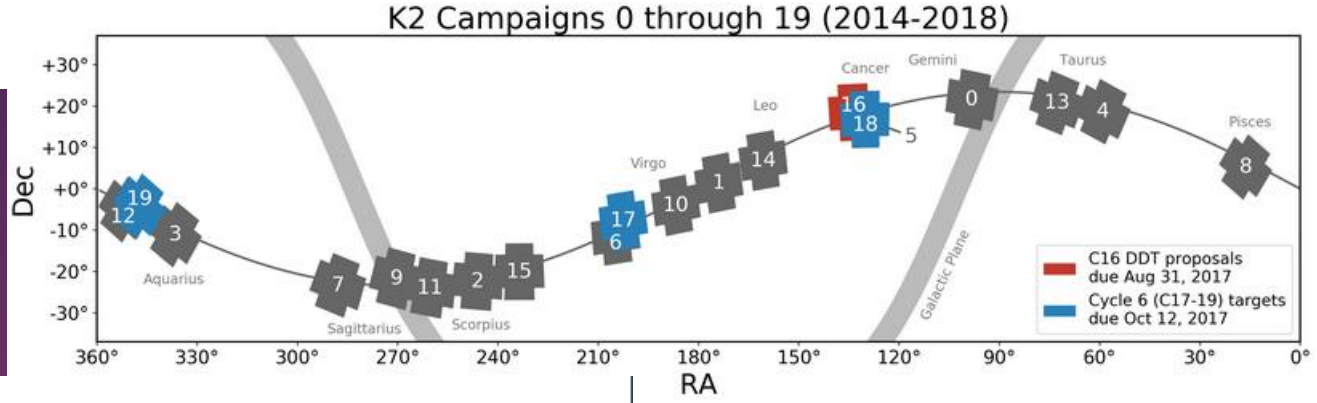
Outline

- OBERVATION OF LAMOST-K2 field
- Data in LAMOST-K2 Campaign 1 field
- Asteroseismic parameters
- Stellar parameters comparison (Teff,log g)



Field	Start	Stop	Data available	RA	Dec	Target list	Release notes	Comments
0	2014 Mar 08	2014 May 27	2014 Sep 08	06:33:11	+21:35:16	✔	✔	Near Galactic Anti-center, M35, NGC 2158
1	2014 May 30	2014 Aug 21	2014 Dec 23	11:35:46	+01:25:02	✔	✔	North Galactic Cap
2	2014 Aug 23	2014 Nov 13	2015 Mar 16	16:24:30	-22:26:50	✔	✔	Near Gal Center, M4, M80, M19, Upr Sco, ρ Oph
3	2014 Nov 14	2015 Feb 03	2015 Jul 17	22:26:40	-11:05:48	✔	✔	South Galactic Cap, Neptune
4	2015 Feb 07	2015 Apr 23	2015 Sep 04	03:56:18	+18:39:38	✔	✔	M45 (Pleiades), NGC1647, Hyades
5	2015 Apr 27	2015 Jul 10	2015 Oct 31	08:40:38	+16:49:47	✔	✔	M44 (Beehive), M67
6	2015 Jul 14	2015 Sep 30	2016 Feb 12	13:39:28	-11:17:43	✔	✔	North Galactic Cap
7	2015 Oct 04	2015 Dec 26	2016 Apr 20	19:11:19	-23:21:36	✔	✔	Near Galactic Center, NGC 6717, Pluto
8	2016 Jan 03	2016 Mar 23	2016 Jul 04	01:05:21	+05:15:44	✔	✔	Uranus, IC1613
9†	2016 Apr 21	2016 Jul 01	2016 Sep 30	18:01:25	-21:46:47	✔	✔	Gal Center, M21, M18, M25, M8, Earth, Mars
10	2016 Jul 06	2016 Sep 20	2016 Dec 20	12:27:07	-04:01:38	✔	✔	North Galactic Cap
11	2016 Sep 24	2016 Dec 08	2017 Jun 30	17:21:33	-23:58:33	✔	✔	Galactic Center, Saturn
12	2016 Dec 15	2017 Mar 04	2017 Aug 2	23:26:38	-05:06:08	✔		South Galactic Cap, Chiron, Mars
13	2017 Mar 08	2017 May 27	2017 Sep 5	04:51:11	+20:47:11	✔		Hyades, Taurus
14	2017 May 31	2017 Aug 19	2017 Nov-Jan	10:42:44	+06:51:06	✔		North Galactic Cap, Wolf 359, WASP-104
15	2017 Aug 23	2017 Nov 20	2018 Feb-Apr	15:34:28	-20:04:44			Upper Sco, GW Lib, HP Lib
16†	2017 Dec 7	2018 Feb 25	2018 Apr-Jun	08:54:50	+18:31:31			M44 (Beehive), M67, Earth.

LAMOST-K2 Fields

LAMOST-K2 fields

C8 C4 C0 C5 C1 C6

53 nights (2015-12-30/2017-04-28）

86 plates

Spectral：168081

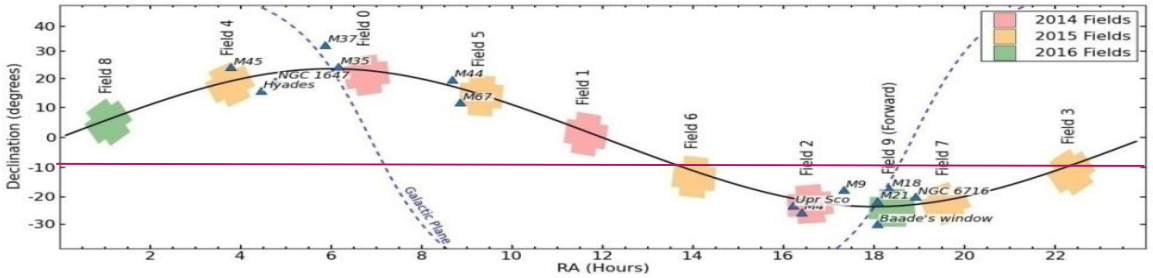
Parameters ： 112843

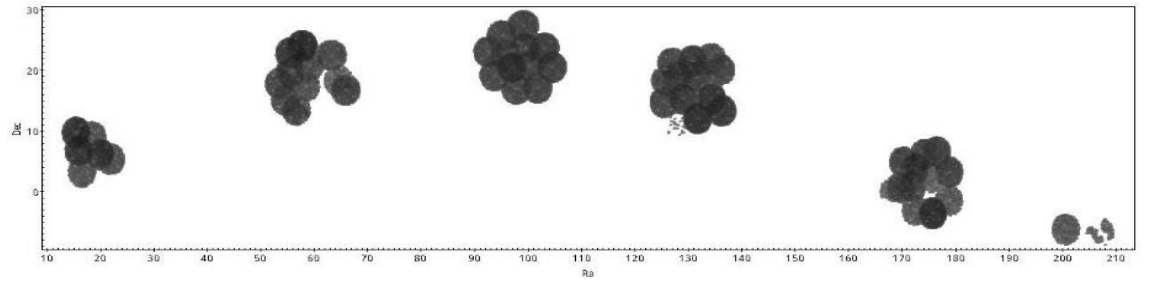
Giant: 20350

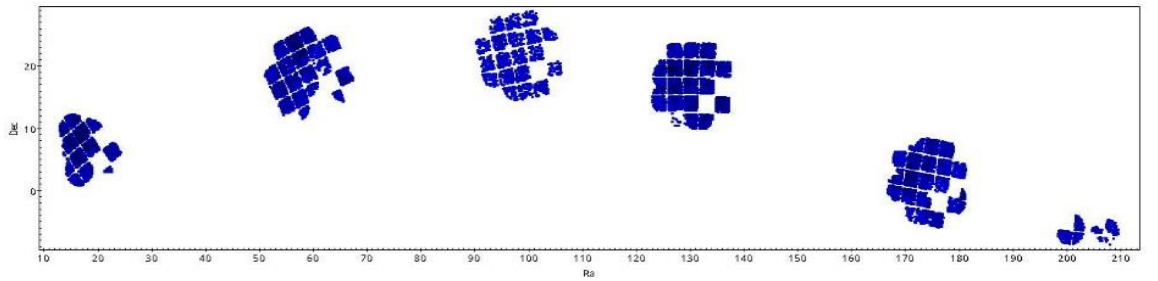
Dwarf: 92502

LAMOST-K2 overlapped targets:

24661

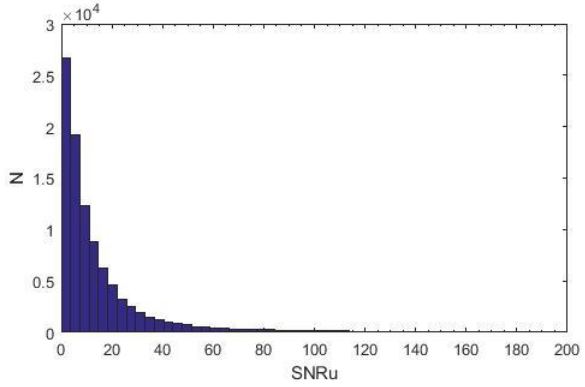


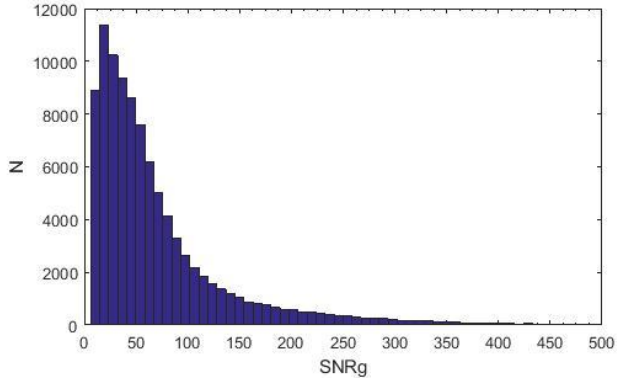


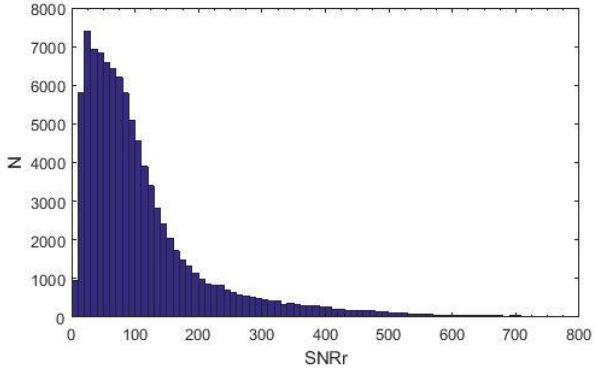


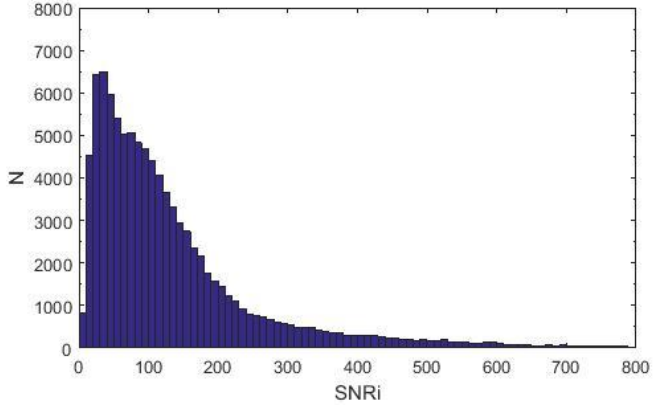
The distribution of the signal to noise ratio

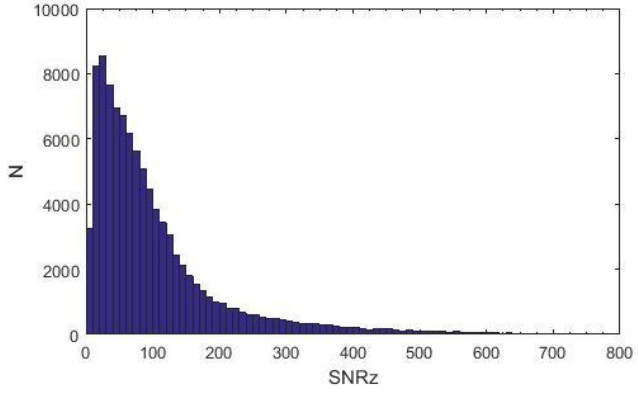
- i>20 105013 >50 83606











Calibration function of stellar parameters

$$P_i = (P_{i,LASP} - a) / b$$

- **Ren et al.(2016)**

$$\sigma = \sqrt{\sigma_{in}^2 + \sigma_{ex}^2}$$

$T_{eff} \Rightarrow$

$\sigma_{in} = 47.0X^2 - 232.1X - 342.1K$

$a = 299K, b = 0.94, \sigma_{ex} = 131K(giants)$

$a = 99K, b = 1.02, \sigma_{ex} = 104K(dwarfs)$

$\log g \Rightarrow$

$\sigma_{in} = 0.070X^2 - 0.366X + 0.532dex$

$a = 0.67dex, b = 0.80, \sigma_{ex} = 0.19dex(giants)$

$a = 0.59dex, b = 0.86, \sigma_{ex} = 0.16dex(dwarfs)$

$[Fe/H] \Rightarrow$

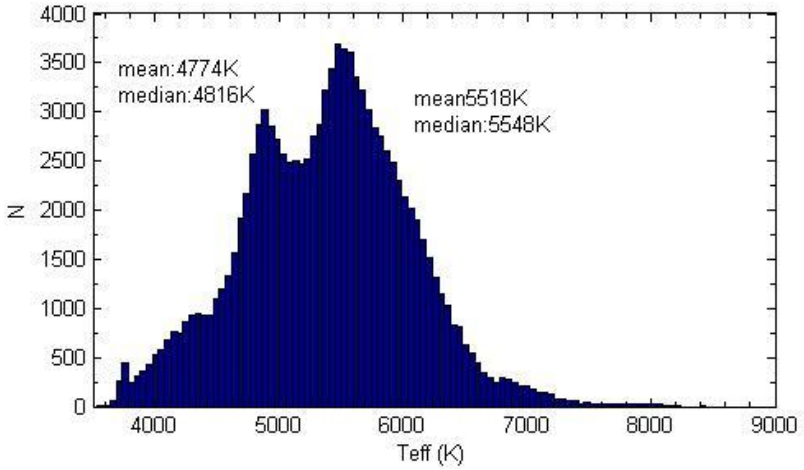
$\sigma_{in} = 0.045X^2 - 0.253X + 0.386dex$

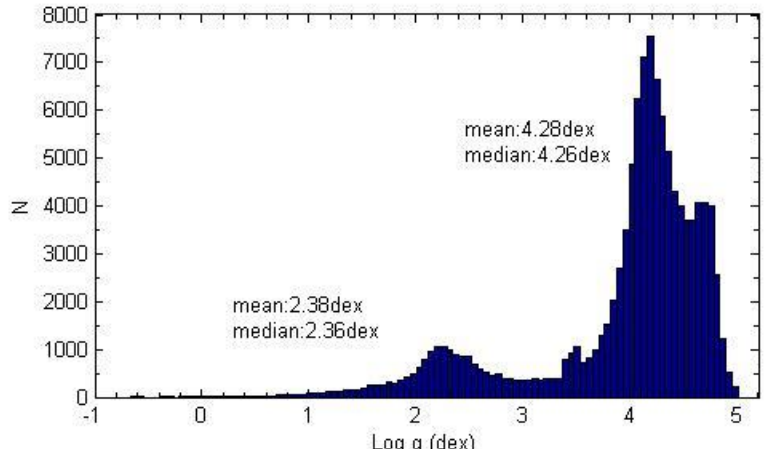
$a = 0.05dex, b = 0.95, \sigma_{ex} = 0.15dex(giants)$

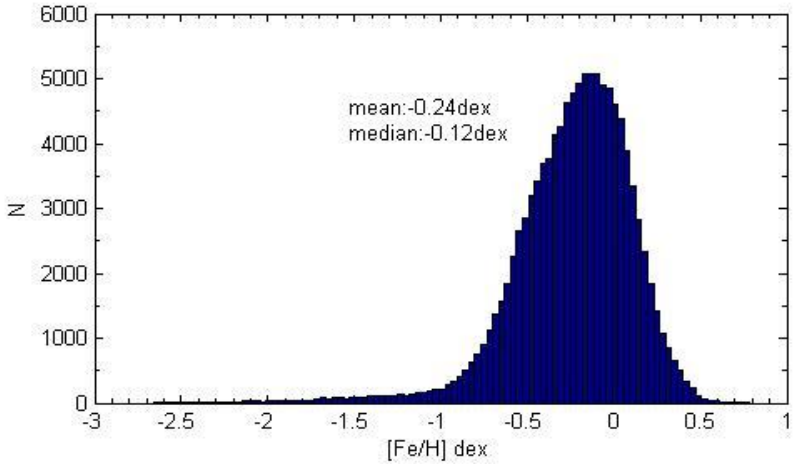
$a = 0.00dex, b = 0.96, \sigma_{ex} = 0.10dex(dwarfs)$

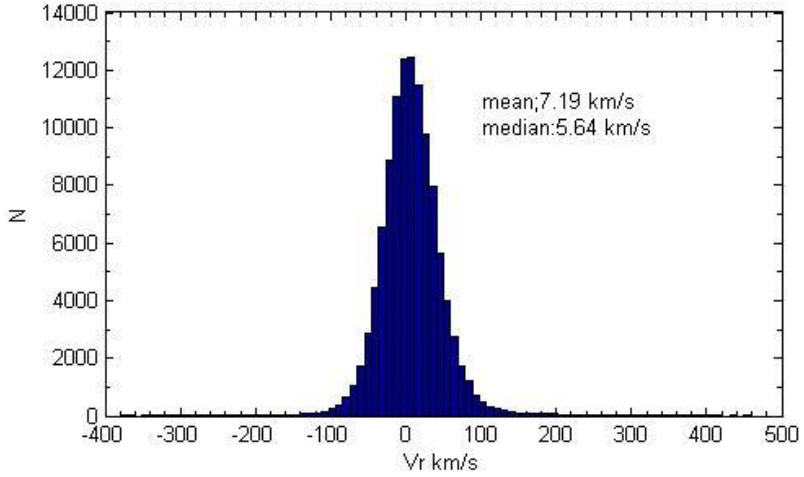
The distribution of parameters

[Fe/H]<-1dex 3104 <-2dex 272； |Vr|>300km/s 92









Data of LAMOST-K2 campaign1

The position of Campaign 1

Ra 11：35:46 Dec +01:25:02

17 nights (2016-01-04/2017-04-28)

11 Plates

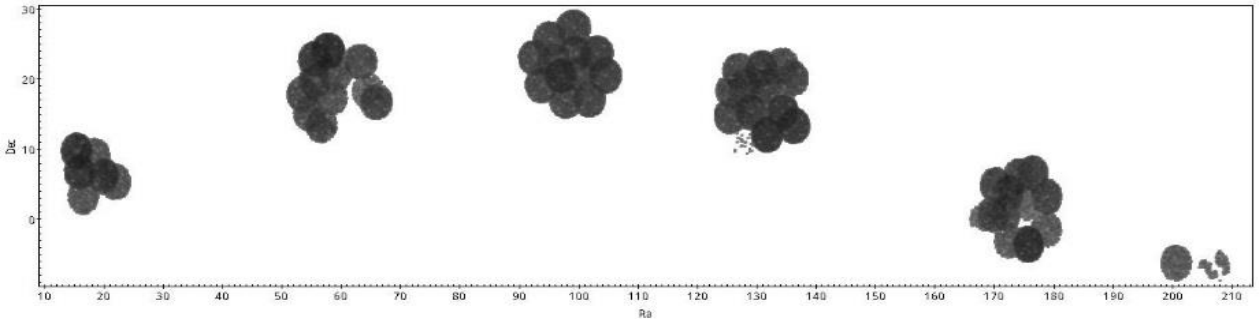
Spectral :34374

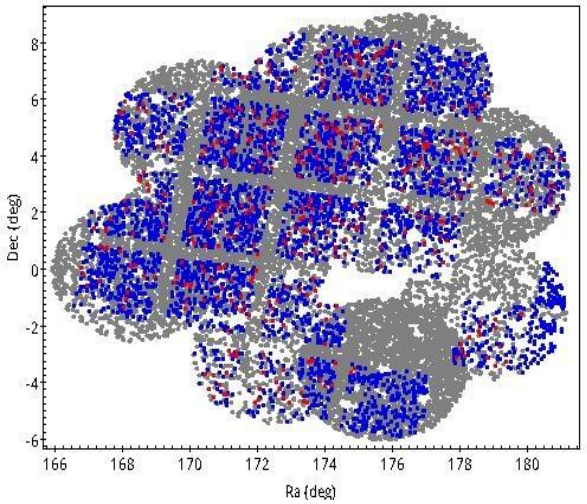
Parameters: 22569

Giant: 2301

Dwarf : 20268

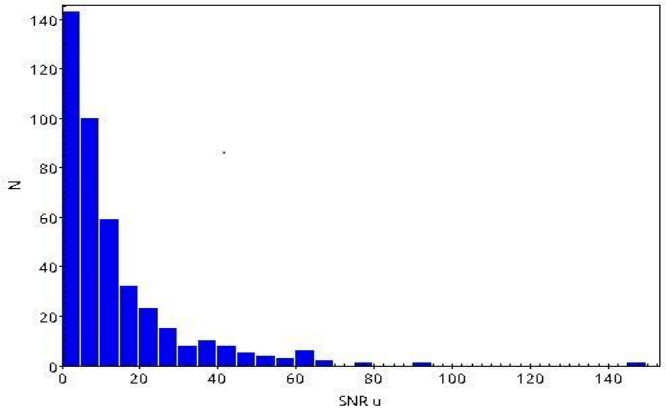
Overlapped targets: 5374

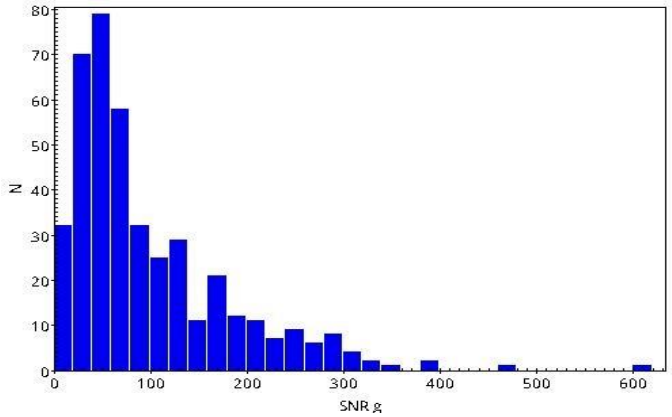


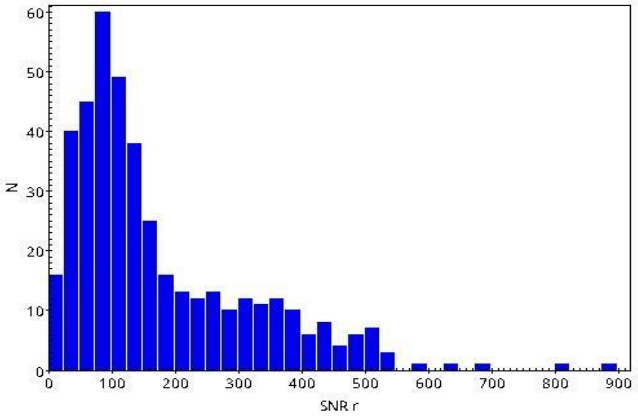


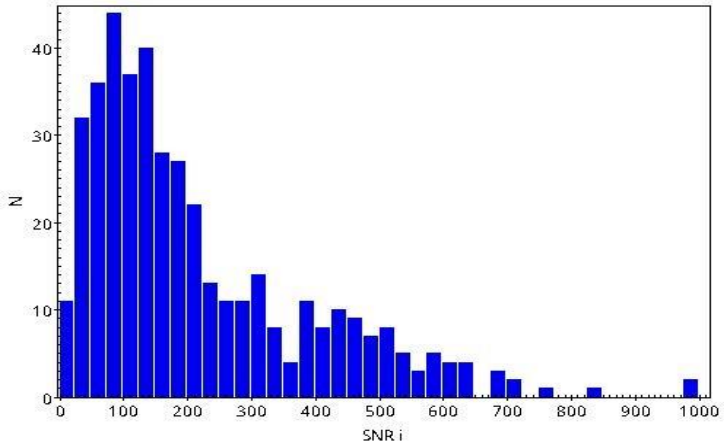
Signal to noise ratio in LC1 field

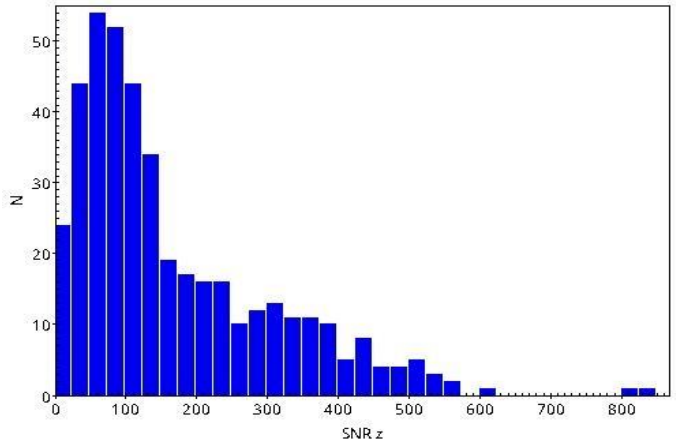
i>20 19959





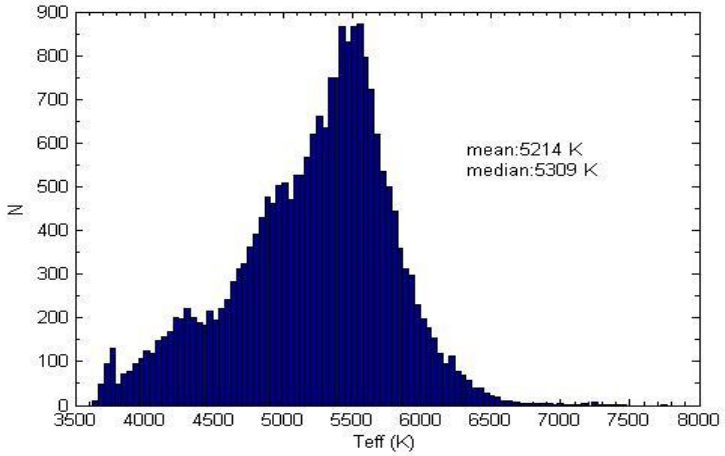


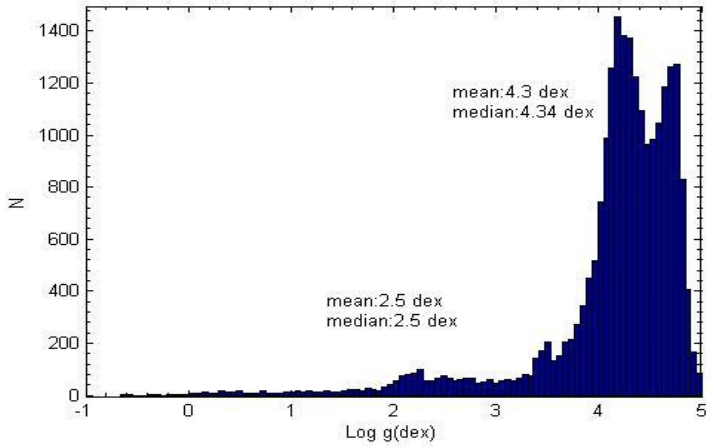


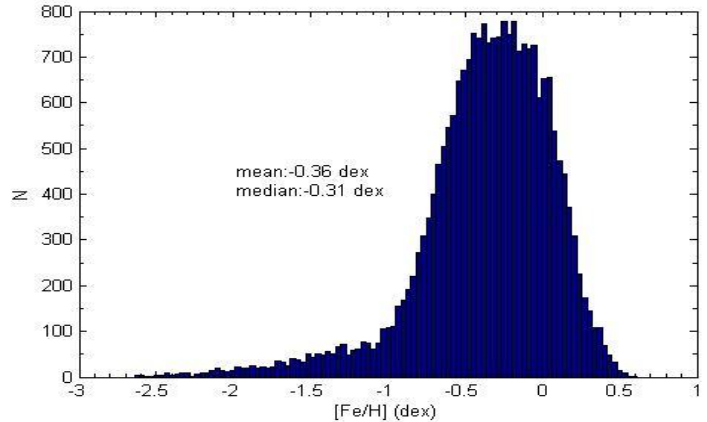


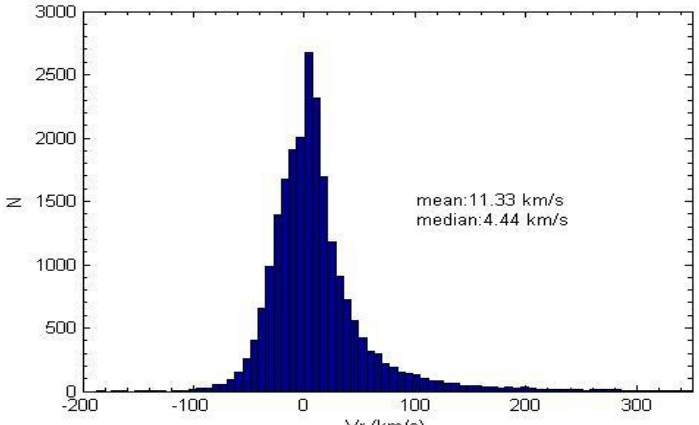
The parameters of targets in C1

[Fe/H]<-1 dex 1560 [Fe/H]<-2 dex 147 |Vr|>300km/s 31



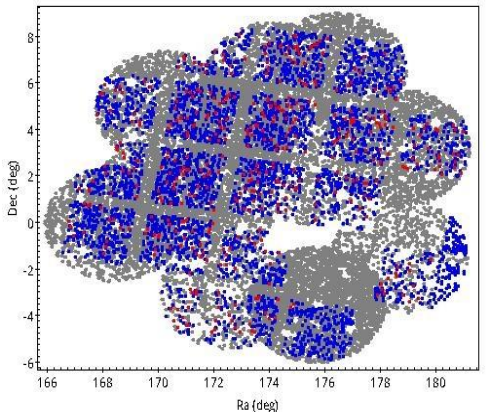


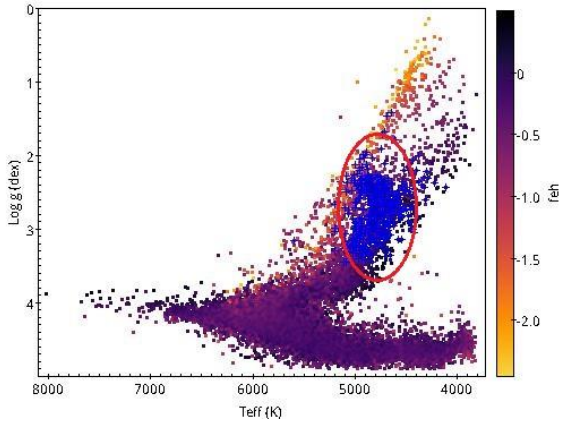


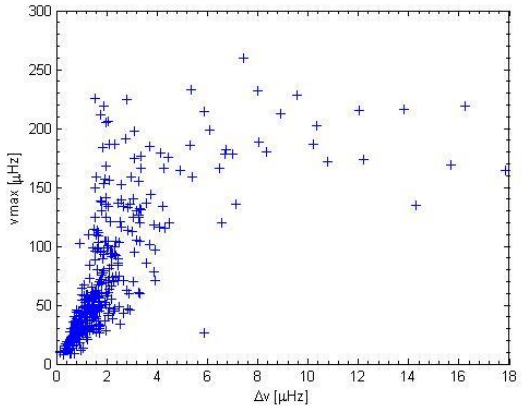


The asteroseismic parameters in K2-C1

- The asteroseismic parameters of 922 targets in K2-C1 field have obtained （Dennis Stello 2016) (Red giant)
- $\nu_{\max}$ and Δv have been derived from six independent pipelines （CAN,COR,BHM,A2Z,SYD,BAM）
- 425 LAMOST-K2 samples with asteroseismic parameters $T_{eff} \in [4000,5600], \log g \in [1.4,3.5], [Fe/H] \in [-2.5,0.4]$





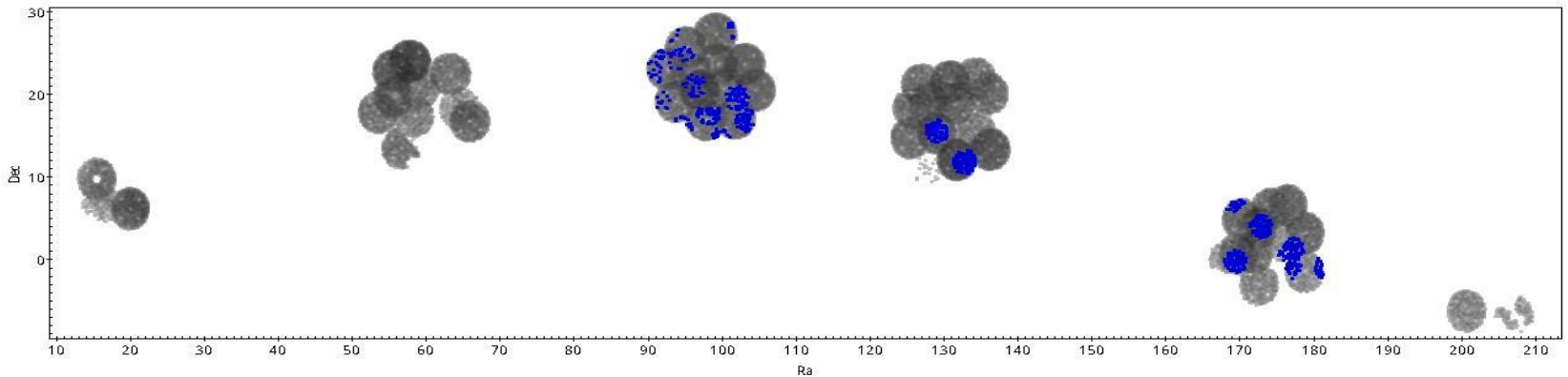


Asteroseismic Surface gravity

$$\log g = \log g_{\Theta} + \log\left(\frac{\nu_{\max}}{\nu_{\max,\Theta}}\right) + \frac{1}{2}\log\left(\frac{T_{eff}}{T_{eff,\Theta}}\right)$$

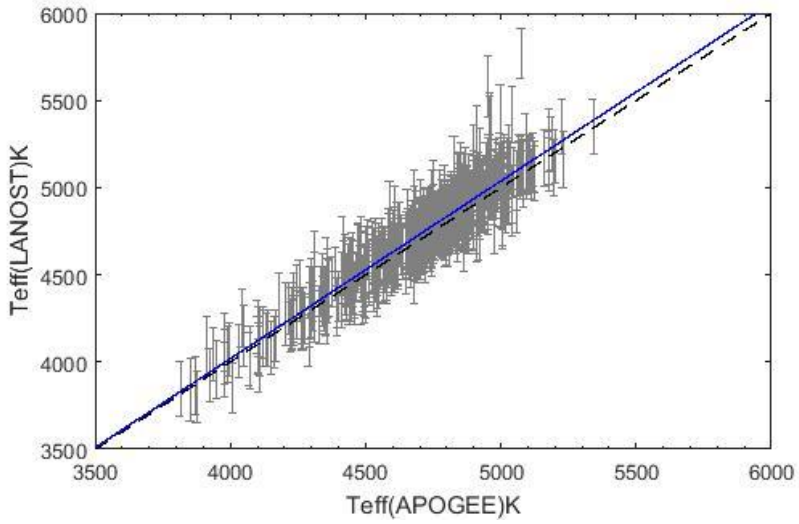
- Independent log g of LAMOST-K2 → APOGEE2-DR13
- APOGEE：SNR>100 LAMOST: SNR i>20

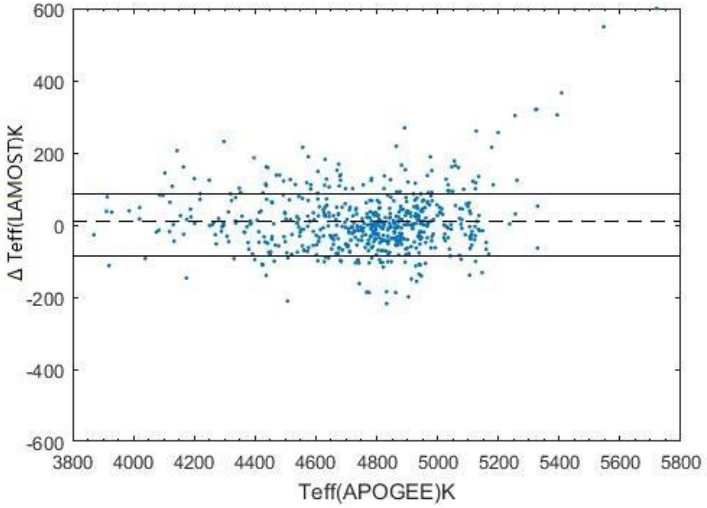
  APOGEE-LAMOST:1011 giant：590



Comparison of Teff between APOGEE and LAMOST

- 590 giant



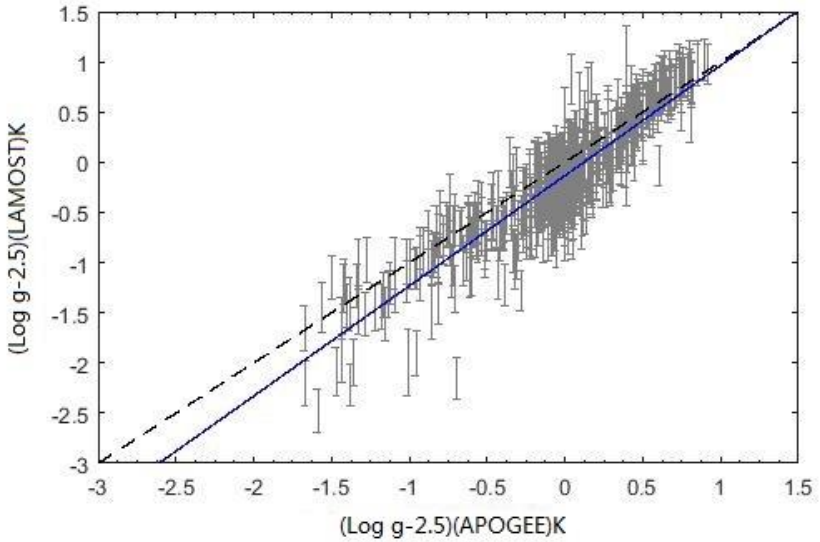


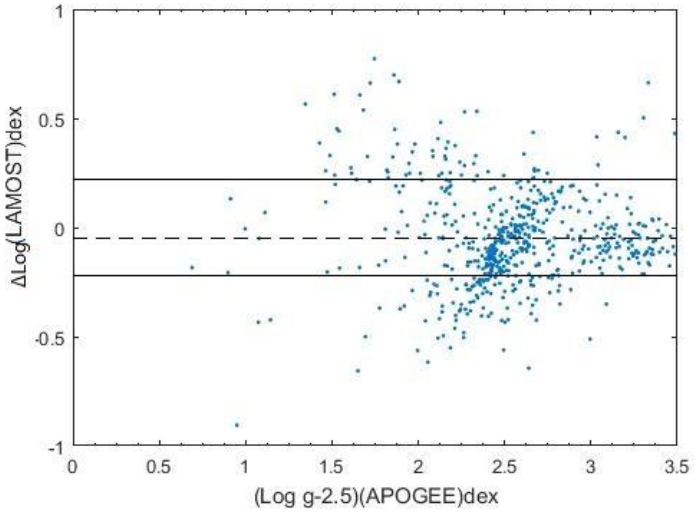
$$T_{eff,LASP} = 1.02T_{eff,ASPCAP} - 56$$

$$mean = 8.9K, \sigma = 86K$$

Comparison of log g between APOGEE and LAMOST

- 590 giant



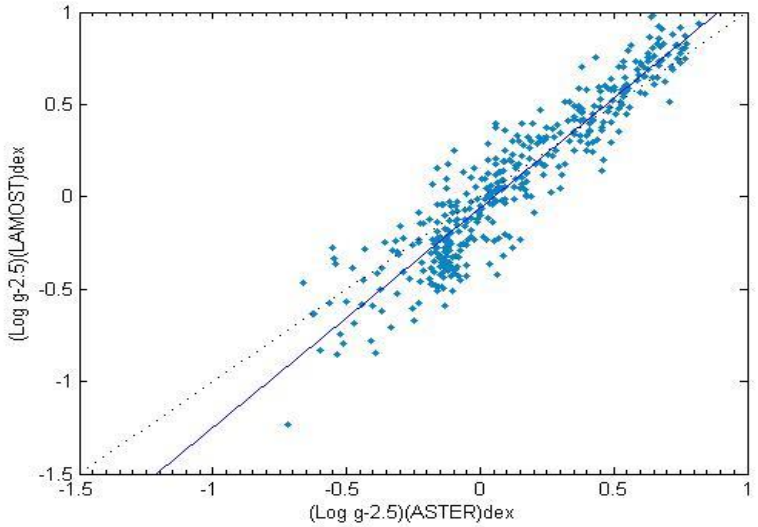


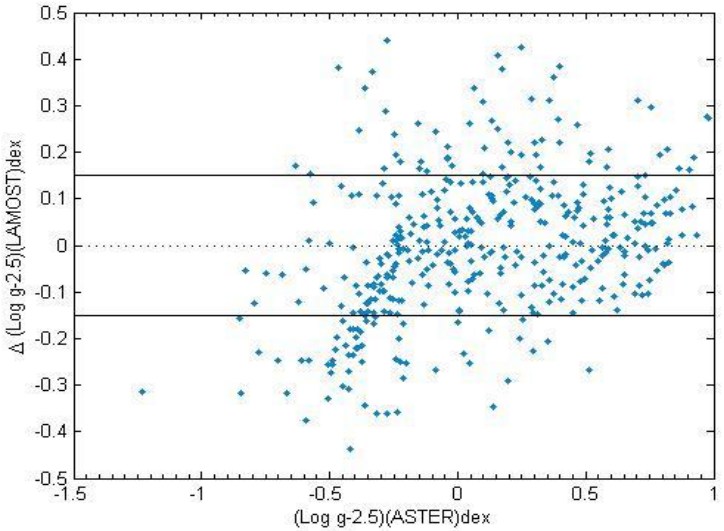
$$(\log g_{LASP} - 2.5) = 1.10(\log g_{ASPCAP} - 2.5) - 0.13$$

$$mean = -0.05 dex, \sigma = 0.22 dex$$

Asteroseismic log g vs LAMOST log g

13 targets lie outside of 3σ(412)



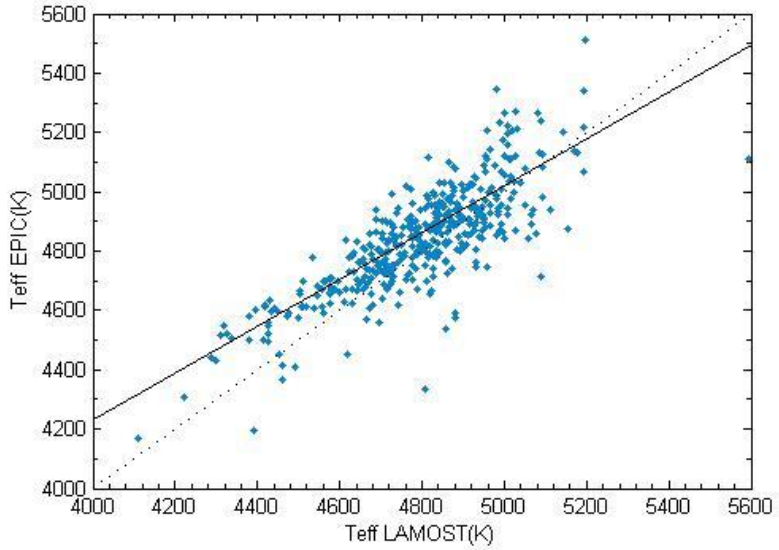


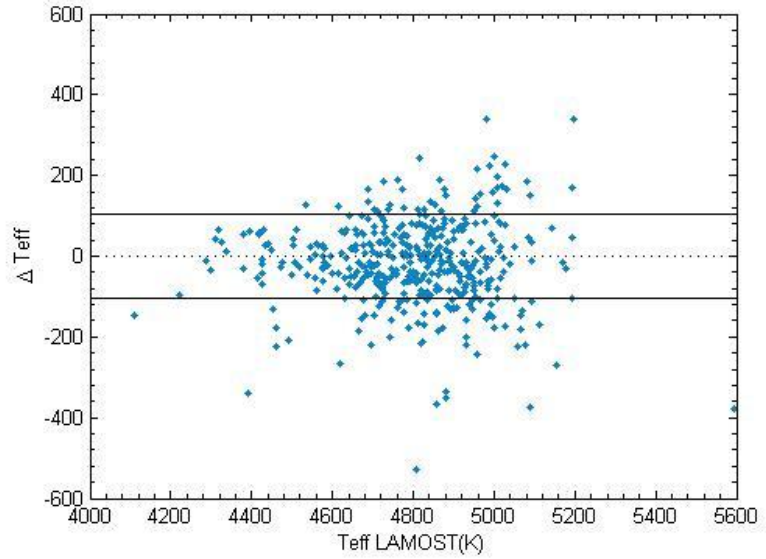
$$\log g_{LAMOST} - 2.5 = 1.19(\log g_{aster} - 2.5) - 0.06$$

$$mean = -0.0006dex, \sigma = 0.15dex$$

Comparison of Teff between LAMOST and EPIC

425 red giants



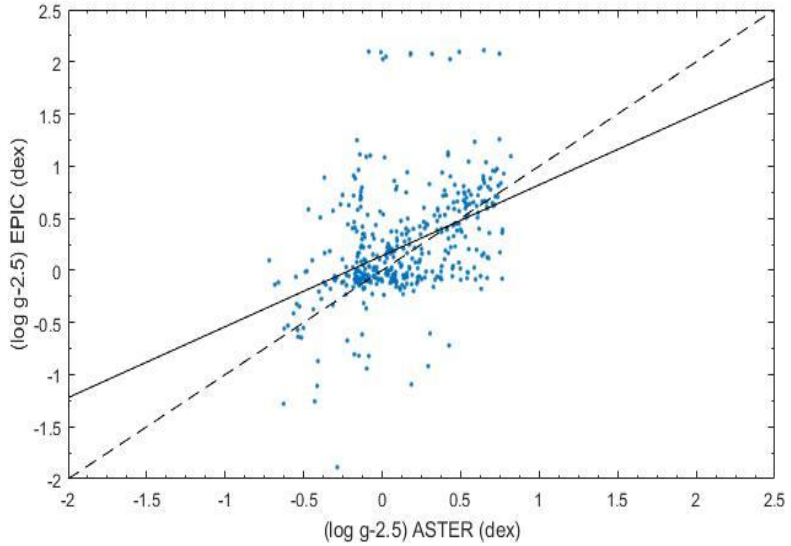


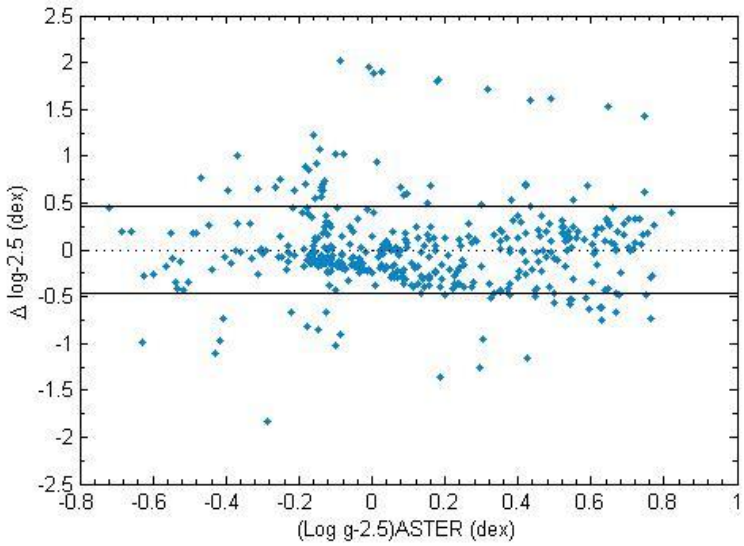
$$0.79T_{eff,LAMOST}+1069=T_{eff,EPIC}$$

$$mean = -18K, \sigma = 105K$$

Comparison of log g between asteroseismic method and EPIC

425 red giants





$$\log g_{EPIC} - 2.5 = 0.68(\log g_{aster} - 2.5) + 0.14$$

$$mean = 0.0024 dex, \sigma = 0.47 dex$$

Thank you for your attention