

# A New Transition Wolf-Rayet WN/C Star in the Milky Way

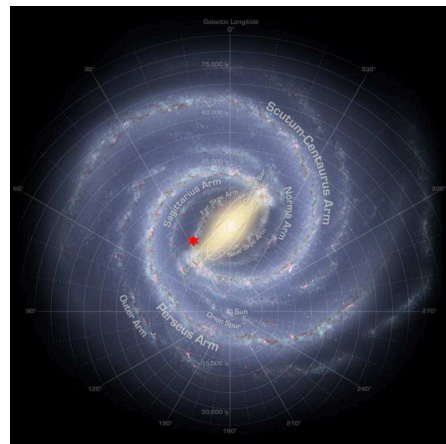
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## Abstract

- 新しい transition type の WN/C を発見 : WR121-16
- 可視分光観測 (@Xinglong Observatory) → WN7/WC
- Gaia database → 7.11 kpc from the Earth, 3.75 kpc from GC
- PoWR model → mass, mass-loss rate, Luminosity, T\*, Xelement
- AAVSO → V-band での変動 : 13.95~14.14 mag (周期なし (不明) )

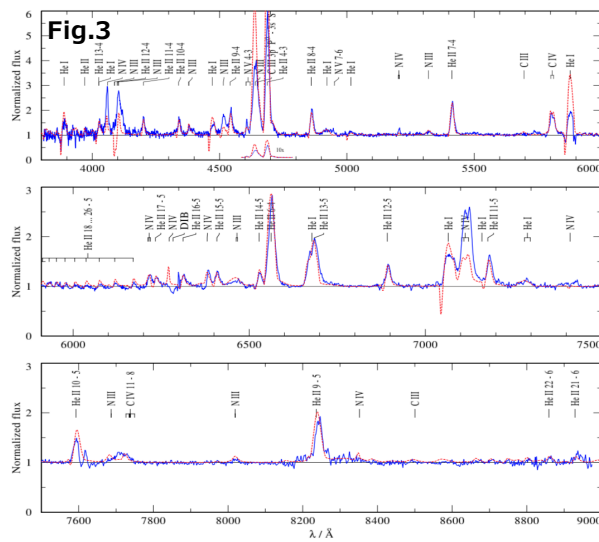
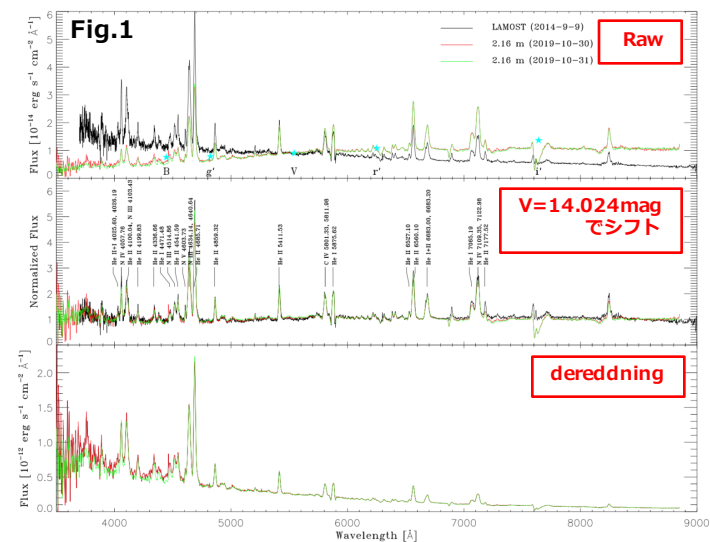
## Introduction

- transition phase は非常に短い : ~1 Myr
- 10 数個のみ (@MW, LMC, SMC, IC10, N1313, M31, M33, M81)



## Observation & Data

- LAMOST (Large Sky Area Multi-Object Fiber Spectroscopic Telescope) @ Xinglong Observatory : 2014.9.9, 3700-9000Å, R~1800, 1800sec
- BFOSC (BAO Faint Object Spectrograph and Camera) @ Xinglong Observatory : 2019.10.30&31, 3250-8850Å, R~1600, 1200sec  
→ NIII 4634-4611, NIV 4057, 7109, 7123, NV 4604, 4933-4944, (4620), HeI, HeII, CIV 5808, (CIII 5696 : NG)



## Binary ? Transition ?

### Line ratio

- HeII 5411 / HeI 5875 ~ 0.82  
→ WN7 (Smith+1996)
- log EW(HeII 4686) = 1.86  
log EW(CIV 5808) = 1.33 → **WN/C**

X : spectrum for WR+O

X : radial velocity variation for WN+WC

○ : spectrum for WN/C

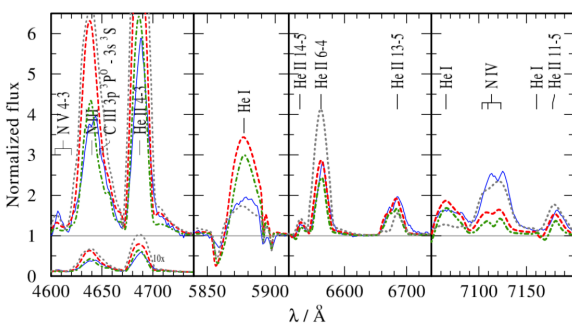
## Stellar Parameters

- **Potsdam Wolf-Rayet (PoWR) model**
  - : Spherical expansion
  - : non-thermal equilibrium
  - : non-LTE
  - : metal blanketing
- Table.3

Table 3. PoWR parameters of the new WN/C star

$T_*$	kK	$47^{+9}_{-5}$
$\log R_t$	$R_\odot$	$0.8^{+0.2}_{-0.1}$
$v_\infty$	$\text{km s}^{-1}$	$1000^{+200}_{-200}$
$\log \dot{M}$	$M_\odot \text{ yr}^{-1}$	$-4.97^{+0.16}_{-0.20}$
$R_*$	$R_\odot$	$4.14^{+1.4}_{-1.3}$
$\log L$	$L_\odot$	$4.88^{+0.17}_{-0.15}$
$M_*$	$M_\odot$	$7.1^{+1.7}_{-1.1}$
D	clumping factor	4
$X_H$	Mass fraction	0.0%
$X_{He}$	Mass fraction	98%
$X_{Fe}$	Mass fraction	0.14%
$X_N$	Mass fraction	$1.5^{+1}_{-1}\%$
$X_C$	Mass fraction	$0.2^{+0.1}_{-0.1}\%$
$X_O$	Mass fraction	<0.2%

## Fig.5



- ▲ observed : blue, PoWR : red,
- green : T\*=42kK, log(Rt/R☉)=1.0
- gray : T\*=56kK, log(Rt/R☉)=0.7

cf : Xc~WR58=0.1%, WR121=5%

## Fig.6 : HRD

