The NStED Stellar and Exoplanet Hosting Star Service

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Abstract & Introduction: The NASA Star and Exoplanet Database (NStED) is a general purpose stellar archive with the aim of providing support for NASA's planet finding and characterization goals, stellar astrophysics, and the planning of NASA and other space missions. There are two principal components of NStED: a database of 140,000 nearby stars and exoplanet-hosting stars, and an archive dedicated to high precision photometric surveys for transiting exoplanets. We present a summary of the NStED stellar database, functionality, tools, and user interface. NStED currently serves the following kinds of data for 140,000 stars (where available): coordinates, multiplicity, proper motion, parallax, spectral type, multiband photometry, radial velocity, metallicity, chromospheric and coronal activity index, rotation velocity/period, infrared excess, etc. Furthermore, the following derived quantities are given wherever possible: distance, effective temperature, mass, radius, luminosity, age, space motions, and physical/angular dimensions of habitable zone. Queries to NStED can be made using constraints on any combination of the above parameters. In addition, NStED provides tools to derive specific inferred quantities for the stars in the database, cross-referenced with available extra-solar planetary data for those host stars.

Object and Aliases

HIP 98505	GJ 4130	TYC 2141-00972-1	2MASS J20004370+2242391	HD 189733
BD+22 3887	SAO 88060			

Multiplicity	
Number of components listed in the WDS catalog	0
Number of known planets	1
Link to Planet Encyclopedia	http://exoplanet.eu/star.php?st=HD+189733

Variability		
Type	Amplitude (mags)	Period (days)
Hipparcos type: M	0.06	

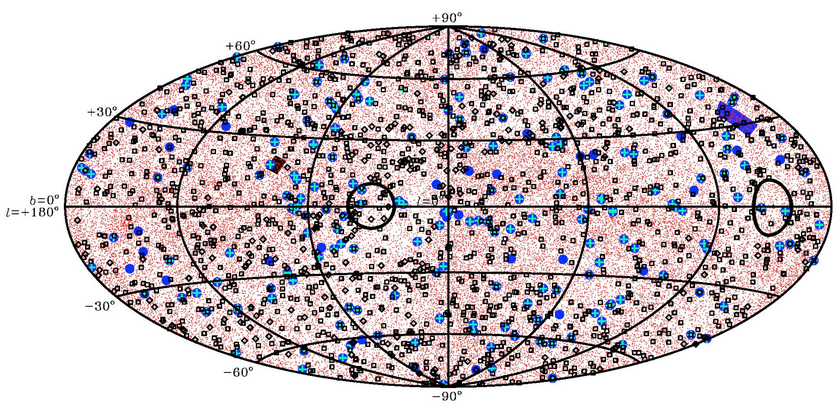
Coordinates		
System	Right Ascension / Longitude	Declination / Latitude
Equatorial J2000	20h 0m43.71s	22d42m39.07s
Ecliptic	308.740882	42.176204
Galactic	60.966021	-3.920403
Proper Motion (mas/year)	-2.800	-250.700

Physical Properties	Value	Uncertainty	Number of measurements
Distance (pc)	19.25	0.33	1
Parallax (mas)	51.94	0.87	1
Spectral Type ("MK")	K2 V		2
Luminosity (L_solar)	0.325	0.014	1
Mass (Solar masses)	0.75		1
[Fe/H] (dex)			
Teff (K)	4980.00	100.00	1
Radius (Solar Radii)	0.77	0.05	1
V sini (km/s)	1.0000		1
Radial Velocity (km/sec)	-3.00	0.20	1
S-Index (Mt. Wilson)	0.525	0.068	1
log R'HK			0
X-ray activity (Lx))	28.442		1
Rotation Period (days)			

Photometry	Flux (mag)	Uncertainty (mag)	Number of measurements
U (Johnson)			0
B (Johnson)	8.607	0.016	1
V (Johnson)	7.676	0.010	1
R (Cousins)			0
I (Cousins)			0
J (2MASS)	6.073	0.032	1
H (2MASS)	5.587	0.031	1
K (2MASS)	5.541	0.021	1
IRAC 3.6			0
IRAC 4.5			0
IRAC 5.8			0
IRAC 8.0			0
Band	**Flux (Jy)**	**Uncertainty (Jy)**	**Number of measurements**
MIPS 24			0
MIPS 70			0
MIPS 160			0
IRAS 12			0
IRAS 25			0
IRAS 60			0
IRAS 100			0

Colors	Flux (mag)	Uncertainty (mag)	Number of measurements
U-B (Johnson)			0
B-V (Johnson)	0.931	0.019	1
V-I (Cousins)			0
J-H (2MASS)	0.486	0.045	1
H-K (2MASS)	0.046	0.037	1
J-K (2MASS)	0.532	0.038	1
b-y (Stromgren)	0.527	0.003	1
m1 (Stromgren)	0.442	0.004	1
c1 (Stromgren)	0.272	0.006	1

Above: An example NStED overview page, in this case resulting from a query on HD 189733.

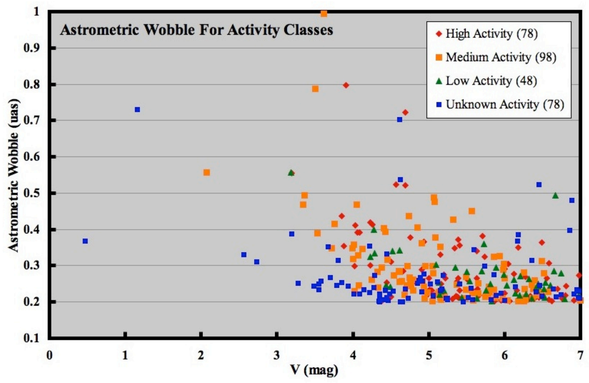


Above: Aitoff projection of the contents of NStED. Red dots: dwarf stars (for clarity, the giant stars are not plotted); large blue dots: exoplanet hosting stars; large green plus signs: stars with radial velocity curves or photometric light curves; open black squares/diamonds: stars with images/spectra. For an explanation of the remaining features, see companion poster on NStED Exoplanet Transit Survey Service (von Braun et al.).

The NStED Services

- Stellar Services
  - Data related to relatively bright nearby stars
    - All known planet-hosting stars
  - Query for individual stars or by stellar/planetary parameters
  - Images and spectra
- Exoplanet Services
  - Data related to known exoplanets
  - Photometric light curves of transiting exoplanets
  - Dedicated interface related to exo-planet transit surveys (see poster by von Braun et al.)

Below: Plot of predicted astrometric wobble for an Earth-sized planet in the habitable zone vs. the apparent V magnitude of the stars, generated using data served by NStED. The stars are sorted by activity level estimates from the R'(HK) index, S index, and X-ray luminosity.



Stellar Content for NStED

- Approximately 140,000 stars
- Associated data include:
  - Next 2000 (N2K) Stars template spectra
  - Coronographic images from Palomar
  - 2MASS image mosaics

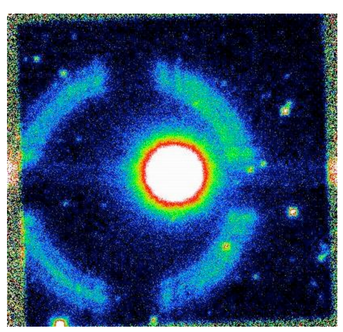
Published Parameters		Derived Parameters	Associated Data
Position, Distances	Metallicity	Temperature	Images
Kinematics	Rotation	Luminosity	Spectra
Photometry, Colors	Activity Indicators	Radius	
Spectral type	Variability	Mass	
Luminosity Class	Multiplicity	LSR Space Motion	

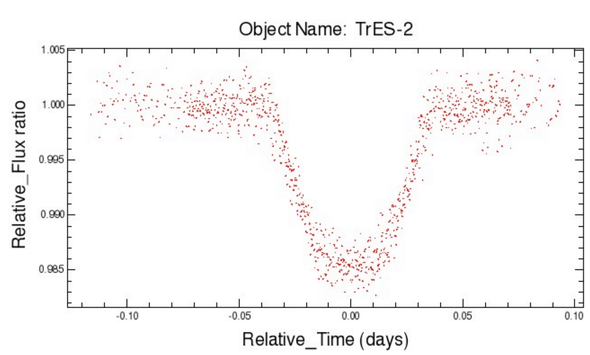
Exoplanet Content for NStED

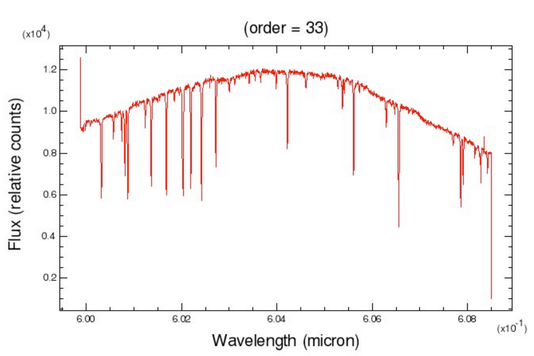
- Published parameters for known exoplanets
- Derived parameters for all the dwarf stars
- Associated data
  - For both known exoplanet hosting stars and others stars surveyed
  - light curves from published data in the literature

Published Parameters	Predicted Parameters	Associated Data
Number of Planets	Habitable Zone	High Contrast Images
Planetary Mass	Astrometric Wobble	Light curves of Transiting Systems
Orbital Period	Radial Velocity Wobble	
Orbital semi-major axis	Earth V magnitude	
Orbital Eccentricity	Earth 10 μm flux density	
Link to Exoplanet Encyclopedia Entry		

The three figures shown below are examples of the data currently within NStED. These include (from left to right) a coronographic image of GJ 740 from Palomar, the lightcurve of the transiting exoplanet TrES-2, and the N2K spectrum of HD 804.







http://nsted.ipac.caltech.edu

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