

A Database of Companion Search Non-Detections For Nearby Stars

Joe Carson
Jet Propulsion Laboratory

John Krist (JPL), Angelle Tanner (JPL/Caltech),
Karl Stapelfeldt (JPL), Babar Ali
(Caltech/IPAC), John Stauffer
(Caltech/IPAC), Charles Beichman
(Caltech/JPL), Wes Traub (JPL)



The NASA Star and Exoplanet Database (NS_tED)

STATUS:

Over 140,000 stars searchable

according to:

- Position
- Kinematics
- Multiplicity
- Activity Indicators
- Spectral Type
- Photometry in 12 wavelengths
- Resolved Disks
- Resolved Substellar
- Companions
- Metallicity
- Rotation
- Variability
- RV Planets
- Luminosity
- Effective Temperature
- IR Excess

<http://nsted.ipac.caltech.edu>

NASA Star and Exoplanet Database NS_tED

Documentation

- NS_tED overview
- Why NS_tED?
- Tutorials, Walkthroughs & Compatibility
- NS_tED data
- NS_tED future data & functionalities
- The NS_tED Team
- Acknowledgements
- Contact NS_tED

Search NS_tED

Query by Stellar Parameters [Go](#)

Single Object: [Go](#)

Examples: HD 105, HIP 171
Allowed object/catalase identifiers

User Login

Why Register?
I forgot my password

Username:

Password:

[Register/Log-in](#)

Saved Sessions

Please login/register to use this feature.

NASA Star and Exoplanet Database (NS_tED) is an archive and search facility for data on mainly nearby stars, with emphasis towards planet finding research. The database contains a variety of published measurements of positions, kinematics, photometry, multiplicity, activity, and other fundamental stellar properties (see complete list). The initial population of stars is taken as the entire Hipparcos catalog merged with the rest of the data sources. These data sources (primarily published catalogs and papers) are selected via literature searches on a core group of stars (list). These data are vetted by the NS_tED science team. NS_tED allows users to fully trace the data to the original publication and provides an option to view the 'as published' value of the datum. There are currently 140,230 stars in NS_tED. Read more about why NS_tED is a unique service.

ALERTS: None

To submit your own data to NS_tED please contact the NS_tED team

The high contrast database portion is currently under construction.

High-Contrast Non-Detection Database Guiding Principles

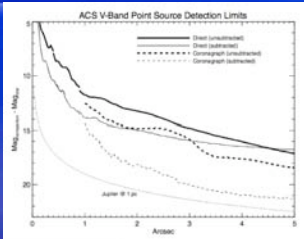
- Non-detections are often not published, but they can be as important as detections. There is a need for non-detection data to be made available to the astronomy community. Such data will provide guidance in target selection for future planet search surveys as well as allowing for large-scale archival population studies.
- The NStED database, with its focus on comprehensive information on nearby stars and exoplanets, makes an ideal avenue to disseminate this information.
- Observers often use different methods to calculate high-contrast sensitivities. There is a need to provide a more uniform “data-driven” method to compare different surveys’ sensitivities.
- Sensitivity calculations and data submission must be relatively painless and straightforward to get observers to participate.
- Original authors must be properly credited for all outputted data.

Joe Carson

Spirit of Lyot 2007

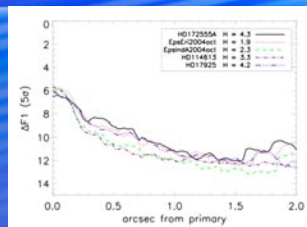
Sensitivity Curves - a range of telescopes, instruments, observing techniques, and algorithms.

HST ACS Roll Subtraction



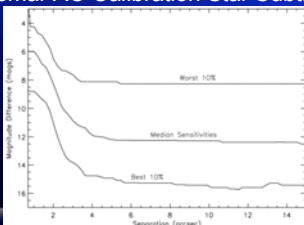
Krist 2004

VLT NACO Simultaneous Differential Imaging



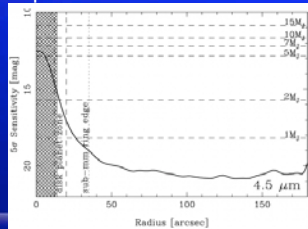
Biller et al. 2007

Palomar AO Calibration Star Subtraction



Carson et al. 2005

Spitzer IRAC Roll Subtraction



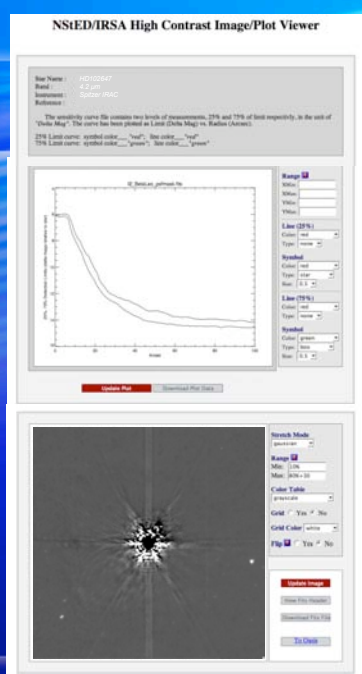
Marengo et al. 2006

Joe Carson

Spirit of Lyot 2007

Point Source Sensitivity Curves

- Database will hold sensitivity curves at multiple wavelengths: most likely H/K from ground AO, J from HST, M band from Spitzer/LBT/JWST.
- Survey contributors apply an IDL script to their data sets to generate high-contrast curves; current inputs include a fits image file, a calibration flux value, and a PSF sharpness or aperture parameter.
- Azimuthal-dependent noise is determined via a boxed root mean square method where the box size approximates an optimal photometric aperture size.
- Radial sensitivity curves outputted for best 75% and best 25% of search areas.
- Sensitivity curve algorithms have been tested with PSF planting on ground-based AO and HST NICMOS data sets.



Joe Carson

Spirit of Lyot 2007

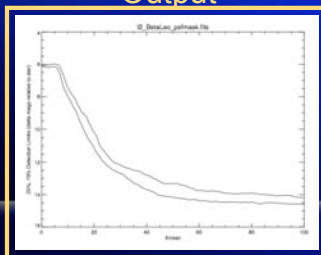
Sensitivity curves are generated by the survey author using the IDL script *limits.pro* (written by J. Krist).

Inputs

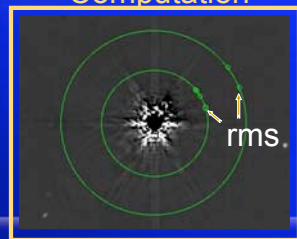
Target Image (preferably fits format)	Mask File (optional; fits or .pro file)	USER PARAMETERS Central Star Approximate Pixel Coordinates. PSF Sharpness Value or Optimal Photometric Aperture Flux Counts (ADU) of the Non-occulted, Non-saturated Parent Star Minimum Meaningful Search Radius (pixels) Maximum Meaningful Search Radius (pixels)



Output



Computation



Joe Carson

Spirit of Lyot 2007

We Need Your High-Contrast Non-Detection Data! - Keck, Lick, VLT, Gemini, Subaru, MMT, HST, Spitzer, and others.

We are accepting feedback on sensitivity algorithms until the end of this month (June). After that we'd like to release a final version of the sensitivity script and ramp up submissions.

Please email Joseph.Carson@jpl.nasa.gov if you would like a copy of the sensitivity script, documentation, or information on submitting your data files.

Thank you to those who have already tested the sensitivity algorithms on your datasets! Pat Lowrance (HST data), Angelle Tanner (Palomar AO data), John Krist (HST data), myself (Palomar AO & Spitzer data) and others.