```
Python 3.7.8 (default, Jul 28 2020, 07:20:54)
Type "help", "copyright", "credits" or "license" for more information.
IPython 7.2.0 -- An enhanced Interactive Python.

In [1]: runfile('/Users/josephmarsioni/Apps/Py Programs/Scap', wdir='/Users/josephmarsioni')
/Users/josephmarsioni/anaconda3/bin/pickle
Using matplotlib backend: MacOSX

Class 0: 12
Class 1: 2147
Class 2: 2160
Class 3: 5246
Class 4: 2160
Class 5: 2160
Class 6: 2160
Class 7: 1215
Class 8: 2160

All: 17870

Obj: 42212
Sky: 52146
Bkgd: 52146
Sky: 52146
Bkg: 52146

All: 17870 47207

Obj: Stars 5246

Obj_m: Stars 5246
Obj_p: Stars 5246
Obj_n: Stars 5246
Obj_s: Stars 5246

SKY_m: Stars 20004
SKY_p: Stars 20004
SKY_n: Stars 20004
SKY_s: Stars 12951

Obj_m: Stars 5246
Obj_p: Stars 5246
Obj_n: Stars 5246
Obj_s: Stars 5246

Bkg_m: Stars 5246
Bkg_p: Stars 5246
Bkg_n: Stars 5246
Bkg_s: Stars 5246

Bkg_m: Stars 15738
Bkg_p: Stars 15738
Bkg_n: Stars 15738
Bkg_s: Stars 15738

Fields: ['DEBLEND-C' 'DEBLEND' 'DEBLEND-NC' ... 'moving_primary' 'ra:gal' 'ra']

Bulge: 2219
back_sequence: 525
subgenre: 1
sub_genre: 1
sub_genre: 1

cu:jbrs: 8361
back_sequence: 1087
subgenre: 461
sub_genre: 1
sub_genre: 1129

Halo: 1764
back_sequence: 1076
subgenre: 1092
sub_genre: 1
sub_genre: 1129

Halo_bhs: 392
back_sequence: 1062
subgenre: 1092
sub_genre: 1
sub_genre: 1100

Halo_dwarf: 1767
back_sequence: 1076
subgenre: 1092
sub_genre: 1
sub_genre: 1411

Halo_stream: 1719
back_sequence: 1076
subgenre: 1092
sub_genre: 1
sub_genre: 1453

Disk: 1
back_sequence: 1130
subgenre: 1092
sub_genre: 1
sub_genre: 1

Disk_sequence: 1514
subgenre: 1092
sub_genre: 1
subgenre: 461
sub_genre: 1

disk: 8011
back_sequence: 1084
subgenre: 1
subgenre: 37
sub_genre: 1146

merge: 10015
back_sequence: 1088
subgenre: 1092
subgenre: 1146
sub_genre: 1

sgr: 1211
back_sequence: 53
subgenre: 1
subgenre: 8
sub_genre: 1144

sgr:clump: 203
back_sequence: 75
subgenre: 1
sub_genre: 1
sub_genre: 1144

cluster:gal: 5449
back_sequence: 1092
subgenre: 461
sub_genre: 1
sub_genre: 6270

cluster:gal: 1519
back_sequence: 1114
subgenre: 1092
sub_genre: 1
sub_genre: 5237

cluster:gal: 9677
back_sequence: 1
subgenre: 1
sub_genre: 1
sub_genre: 5237

cluster:gal: 1
```

Plot BELO
LOSS Bias (M)

Plot BELO
ALPHATOT

Plot BELO
ALPHATOT

Plot BELO
ALPHATOT

Plot BELO
LAMBDACH-K
LOSS Bias (M)

Plot BELO
LAMBDACH-K

Plot BELO
LAMBDACH-K

Plot BELO
LAMBDACH-K
LOSS Bias (M)

Plot BELO
LAMBDACH-K

Plot BELO
LAMBDACH-K

Plot BELO
LAMBDACH-K
LOSS Bias (M)

Plot BELO
LAMBDACH-K

Plot BELO
LAMBDACH-K

Plot BELO
NGNH
LOSS Bias (M)

Plot BELO
NGNH

Plot BELO
NGNH

Plot BELO
OROMA-D
LOSS Bias (M)

Plot BELO
OROMA-D

Plot BELO
OROMA-D

Plot BELO
OROMA-C
LOSS Bias (M)

Plot BELO
OROMA-C

Plot BELO
OROMA-C

Plot BELO
OROMA-C
LOSS Bias (M)

Plot BELO
OROMA-C

Plot BELO

Plot BELO

Plot BELO

Plot BELO

DECALS-2
DECALS-2
LS10 Data 330

Plot BBLD

Plot BBLD

Plot BBLD

Plot BBLD

Plot BBLD

Plot BBLD

Plot BBLD

Plot BBLD

Plot 0014

Plot 0014

Plot 8M2
Plot 8M3a

Plot 8M3b

Plot 8M3c

Plot 8M3-2

DLAT
DLON

CHRONOS-11
DLAT
DLON

NOAA
DLAT
DLON

NOAA
DLAT
DLON

CRONOS-2
DLAT
DLON

CRONOS-3
DLAT
DLON

CRONOS-7
DLAT
DLON

CRONOS-7
DLAT
DLON

CRONOS-8
DLAT
DLON

CRONOS-8
DLAT
DLON

CRONOS-9
DLAT
DLON

CRONOS-9
DLAT
DLON

CRONOS-5
DLAT
DLON

CRONOS-5
DLAT
DLON

CRONOS-6
DLAT
DLON

CRONOS-6
DLAT
DLON

CRONOS-3
DLAT
DLON

CRONOS-3
DLAT
DLON

CRONOS-NAV-5
DLAT
DLON

CRONOS-NAV-5
DLAT
DLON

CRONOS-NAV-6
DLAT
DLON

CRONOS-NAV-6
DLAT
DLON

CROSSCHECK 1

CROSSCHECK 2

CROSSCHECK 3

CROSSCHECK 4

CROSSCHECK 5

CROSSCHECK 6

CROSSCHECK 7

CROSSCHECK 8

PLANEFIX 1

PLANEFIX 2

PLANEFIX 3

PLANEFIX 4

TACS 1MB

TACS 2MB

TACS 5GT

TACS 6GT

TACS 7GT

TACS 8GT

TACS 9GT

Plot 0024

Plot 0024

Fun 818
Fun 818a
Fun 818b
Fun 818b-1
Fun 818b-2
Fun 818b-3
Fun 818b-4
Fun 818b-5
Fun 818b-6
Fun 818b-7
Fun 818b-8
Fun 818b-9
Fun 818b-10
Fun 818b-11
Fun 818b-12
Fun 818b-13
Fun 818b-14
Fun 818b-15
Fun 818b-16
Fun 818b-17
Fun 818b-18
Fun 818b-19
Fun 818b-20
Fun

Plot ID&D

Plot ID&D

Plot ID&D

Plot ID&D

Plot ID&D

Plot ID&D

Plot ID&D

Fun Bin 3
CRONOS
SLAT
SLON
CRONOS
SLAT
SLON
CRONOS-MAX-A
Count
PLAT
Fun Bin 3
CRONOS-MAX-A
SLAT
SLON
CRONOS-MAX-A
SLAT
SLON
CRONOS-MAX-A
Count
PLAT
Fun Bin 3
CRONOS-MAX-B
SLAT
SLON
CRONOS-MAX-B
SLAT
SLON
CRONOS-MAX-B
Count
PLAT
Fun Bin 3
CRONOS-MAX-C
SLAT
SLON
CRONOS-MAX-C
SLAT
SLON
CRONOS-MAX-C
Count
PLAT
Fun Bin 3
CRONOS-MAX-D
SLAT
SLON
CRONOS-MAX-D
SLAT
SLON
CRONOS-MAX-D
Count
PLAT
Fun Bin 3
CRONOS-MAX-E
SLAT
SLON
CRONOS-MAX-E
SLAT
SLON
CRONOS-MAX-E
Count
PLAT
Fun Bin 3
CRONOS-MAX-F
SLAT
SLON
CRONOS-MAX-F
SLAT
SLON
PLANDES-C
Count
PLAT
Fun Bin 3
PLANDES-C
SLAT
SLON
PLANDES-C

Plot 83B3

Plot 83B3

Plot 83B3

Plot 83B3

Plot 83B3

Plot 83B4

Plot 83B4

Mean Density: 1.00 g/cm³
1.00
0.75
0.50
0.25
0.00
-0.25
-0.50
-0.75
-1.00
-1.00
-0.75
-0.50
-0.25
0.00
0.25
0.50
0.75
1.00
Y
X
Z
Y
X
Z
Y
X
Z

```
Class O: 0
Class B: 42
Class A: 295
Class F: 400
Class G: 1404
Class K: 2581
Class M: 2451
Class L: 1
Class T: 0

Fe: 707
GKd: 1389
GKg: 3323
Md: 1884
Mg: 135

All: Stars 7608

BA: Stars 250

Fd_a: Stars 132
Fd_b: Stars 218
Fd_c: Stars 258
Fd_d: Stars 187

GKd_a: Stars 239
GKd_b: Stars 413
GKd_c: Stars 530
GKd_d: Stars 207

GKg_a: Stars 641
GKg_b: Stars 1063
GKg_c: Stars 1151
GKg_d: Stars 468

Md_a: Stars 324
Md_b: Stars 676
Md_c: Stars 612
Md_d: Stars 192

Mg_a: Stars 23
Mg_b: Stars 40
Mg_c: Stars 49
Mg_d: Stars 13

Fields: I'ALPHAPER' 'LAMBDADRI-A' 'LAMBDADRI-B' 'LAMBDADRI-C' 'NGC264' 'ORIONA-B'
 'ORIONA-C' 'ORIONA-D' 'ORIONB-A' 'ORIONB-B' 'ORIONOB1AB-A'
 'ORIONOB1AB-B' 'ORIONOB1AB-C' 'ORIONOB1AB-D' 'ORIONOB1AB-E'
 'PELEIADES-A' 'PELEIADES-B' 'PELEIADES-W' 'TAUL1495' 'TAUL1521' 'TAUL1527'
 'TAUL1536']

Program: yso


https://www.sdss.org/dr16/algorithms/ancillary/apogee/insync/

Embedded Young Stellar Clusters

Summary


Young stellar objects in the Perseus, Orion, and NGC 2264 star forming regions.


Description
Measuring stellar kinematics in star forming regions enables critical tests of theories that
describe the formation and early evolution of stars, planets, and stellar clusters.
The velocities of young stars can reveal if/how the dynamics of star forming regions influence
protostellar mass accretion, the evolution of circumstellar disks, and the structure and ultimate
fate of stellar clusters. Similarly, spectroscopically identified binaries provide important
tests for pre-main sequence (PMS) evolutionary tracks and help identify how the binary population
evolves with age and environment. The INfrared Survey of Young Nebulous Clusters (IN-SYNC)
ancillary science project utilizes APOGEE's unique ability to obtain high-resolution
(R~22,500) spectra of thousands of sources in a single field to study the dynamics and
stellar populations of young clusters.


Perseus


Young stellar objects in Perseus were observed in each of two APOGEE fields, placed such that
they provide optimal coverage of Perseus' sub-clusters, IC 348 and NGC 1333; while still
spanning the full extent of the Perseus Molecular Cloud. A catalog of potential young stellar
objects in Perseus was constructed from:


mid-infrared excess sources identified by the cores-to-disks (c2d) Spitzer survey team across
all of Perseus (Jörgensen et al. 2006; Rebull et al. 2007)
candidate or confirmed IC 348 members, selected via broad-band photometry and/or X-ray observations,
 and often confirmed spectroscopically (e.g. Luhman et al. 1998; Luhman 1999;
 Preibisch & Zinnecker 2001; Preibisch et al. 2001; Luhman et al. 2003, 2005;
 Muench et al. 2003, 2007, priv. communication)
This catalog of likely Perseus members appears highly complete: Muench et al. 2007 find
that their catalog include more than 80% of IC 348 members with H < 16, a finding verified
by our independent analysis of 2MASS source counts in the region (see Figure 2,
Cottaar et al. 2014). Observations of the Perseus fields were designed to maximize the c
ompleteness of the IN-SYNC sample, particularly for sources with 8 < H < 12.5.
Bright sources (H<8) saturate APOGEE's H-band spectrograph, a significant obstacle
to obtaining a complete sample of cluster members in a single visit, particularly in the
densest portions of IC 348 and NGC 1333. Constructing and observing multiple designs for
each field mitigated these fiber collisions, however, maximizing the completeness of
each cluster sample while also sampling multiple epochs for uncrowded sources, providing
some opportunity to identify spectroscopic binaries. The high priority targets in
each cluster (i.e., 8 < H < 12.5) were further sorted according to their
observed H-band SNR (priority decreasing with SNR, assuming uniformity) to ensure that
the survey is as complete as possible for higher mass stars. Once fibers had been allocated
as evenly as possible across all visits to all accessible targets with H < 12.5,
additional cluster members with H < 12.5 were assigned to all designs for that field,
ensuring the maximal S/N possible for these faint targets.


Orion


The sample of targets for the IN-SYNC Orion dataset is based on the 2MASS catalog.
Sources with H<12.5 mag have been restricted within a bent strip approximately 6x1 degrees
in the sky, following the distribution of YSOs in the Orion A region
from Megeath et al. (2012). Five different field centers were defined,
following the YSO densities along the region, with a total of 15 designs.
For each design, targets were selected among all the available sources based on an
iterative Monte Carlo procedure that sought to maximize target counts while
respecting relative priorities for different targets. The target priorities are
calculated from several factors:


to encourage coverage in the crowded regions, priorities are increased as a function of the
local density of candidate sources;
to increase the number of targeted sources faster than the number of epochs for
individual sources, a star already targeted in an existing design was de-prioritized
in future designs, less so if faint (H>11.5);
sources with stellar parameters have priority parameters from the literature
(Da Rio et al. 2010, 2012; Fang et al. 2009, 2013; Hsu et al 2012, 2013)
have priorities increased over non-members or sources with unknown memberships; and
stars with no available stellar parameters but with IR excess detected by Spitzer
(Megeath et al. 2012) have priorities increased over sources with neither stellar
parameters nor detected IR excess.
Using this procedure, a total of 2697 individual sources were targeted.
Of these, 684 are observed on more than 1 epoch, 1403 have available stellar parameters
from the literature, and 1403 have Spitzer IR excess.


NGC 2264


To test the RV precision that APOGEE could achieve for pre-main sequence stars with significant
accretion variability and/or large magnetic spots, 115 candidate NGC 2264 members were
selected for APOGEE observations on the basis of:


optical and/or IR variability identified via CoRoT & Spitzer monitoring of NGC 2264
(Cody et al. 2014)
IRAC colors consistent with Class I/II YSOs (Sung et al. 2009)
X-ray and/or Halpha emission consistent with Class III YSOs (Dahm et al. 2007, Sung et al. 2008)
To provide as many observations of each target as possible, and thus provide the richest dataset
for examining the RV precision that APOGEE can obtain for pre-main sequence stars,
the same set of 115 IN-SYNC targets were observed in each of 6 visits to the APOGEE field
containing NGC 2264 (i.e., 20:40).


Done!
```