Using pyCloudy MdB

June 22, 2016

1 In this example we use the MdB class to access a database of models.

The dabase is 3MdB, described here: https://sites.google.com/site/mexicanmillionmodels/the-different-projects/hii_chim

```
In [13]: %matplotlib inline
         import numpy as np
         import matplotlib.pyplot as plt
         import pyCloudy as pc
         pc.config.db_connector = 'PyMySQL'

In [24]: # Defining the connection parameters.
         OVN_dic = {'host' : '***',
                    'user_name' : 'OVN_user',
                    'user_passwd' : '***', # The password is taken from an environ
                    'base_name' : '3MdB',
                    'master_table' : '`tab`',
                    'teion_table' : '`teion`',
                    'abion_table' : '`abion`',
                    'temis_table' : '`temis`',
                    }
         # Define verbosity level for the database interactions.
         MdB.log_.level = 3
         # Initialisation of the connection
         MdB = pc.MdB(OVN_dic)

warng MdB: Connection to *** failed
warng MdB: Cursor to *** failed
     MdB: Disconnected


In [19]: # Query the database
         res, N = MdB.select_dB(select_='12+oxygen AS OH, nitrogen-oxygen AS NO, lu
                                'TOTL__4363A/H__1__4861A AS O3_4363, O__3__5007A/H_
                                '(S_II__6716A + S_II__6731A)/H__1__4861A AS S2',
                                from_='tab', where_ = 'ref = "HII_CHIm" and com1 =
                                limit_=None, format_ = 'dict2')
```

```
    MdB: Command sent: SELECT 12+oxygen AS OH, nitrogen-oxygen AS NO, lumi AS logU
```

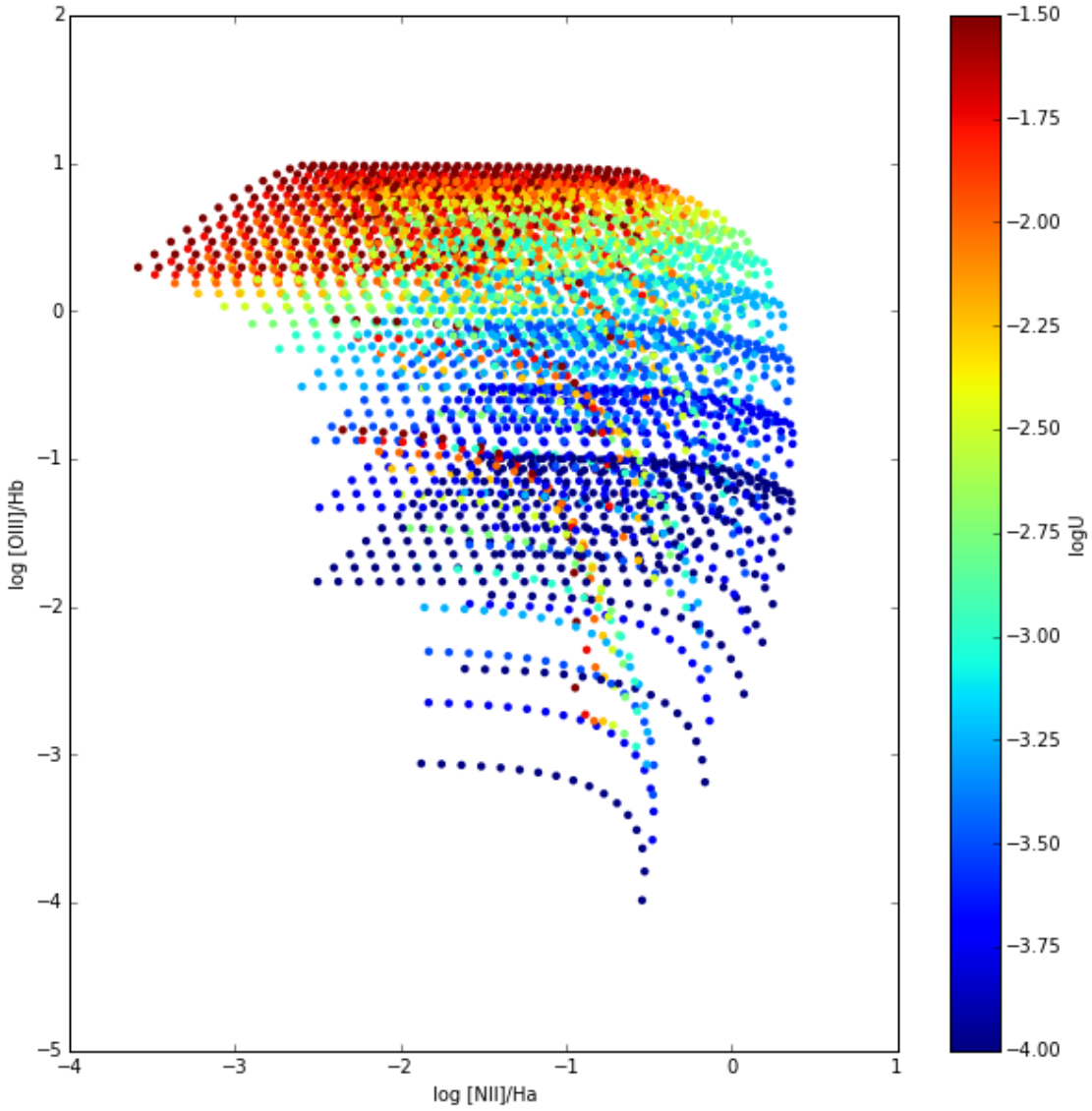
```
In [20]: print(N)

3927
```

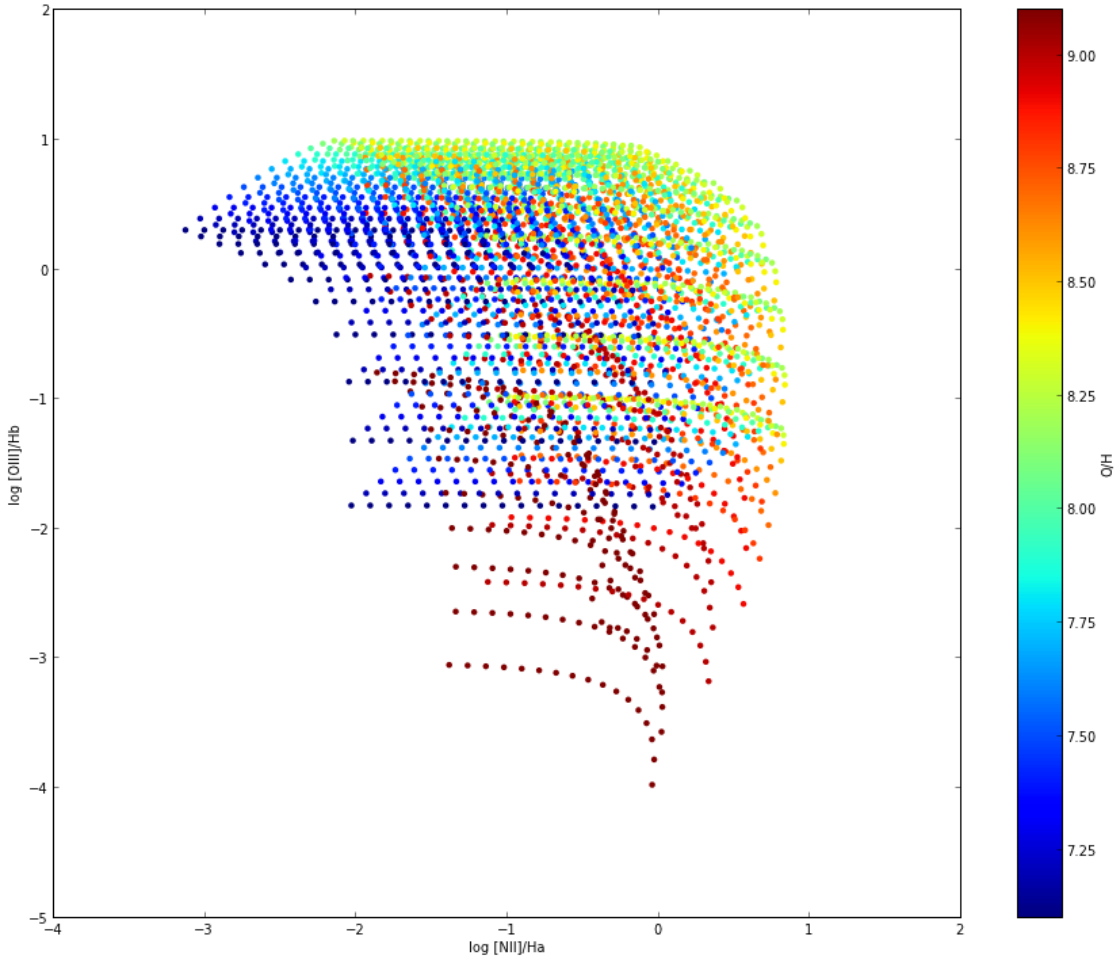
```
In [21]: res

Out[21]: {u'N2': array([ 0.37295509,  0.05138996,  0.29793465, ...,  1.63904092,
                 0.0062069 ,  0.07379963]),
          u'NO': array([-0.625,  0.   , -0.25 , ..., -0.25 , -1.375, -0.375]),
          u'O2': array([ 1.2829238 ,  0.13497929,  0.09475677, ...,  2.95234128,
                 0.34367245,  0.39257675]),
          u'O3': array([  4.10770298e-01,   2.58143588e+00,   2.14617020e-03, ...,
                  1.79309198e-01,   7.55959305e+00,   8.20131176e+00]),
          u'O3_4363': array([  2.68486756e-04,   7.84195649e-02,   1.14699499e-07,
                  5.86599510e-04,   1.64803649e-01,   1.55581694e-01]),
          u'OH': array([ 8.9,  7.3,  9.1, ...,  8.4,  7.9,  8. ]),
          u'S2': array([ 0.45685526,  0.02079208,  0.27993109, ...,  1.41845881,
                 0.05864829,  0.06925091]),
          u'logU': array([-2.75, -1.75, -3.25, ..., -3.75, -1.5 , -1.5 ])}
```

```
In [23]: plt.figure(figsize=(10, 10))
         plt.scatter(np.log10(res['N2']), np.log10(res['O3']), c=res['logU'], edgec
         plt.xlabel('log [NII]/Ha')
         plt.ylabel('log [OIII]/Hb')
         cb = plt.colorbar()
         cb.set_label('logU')
```




```
In [8]: plt.figure(figsize=(15, 12))
        plt.scatter(np.log10(res['N2']), np.log10(res['O3']), c=res['OH'], edgecolo
        plt.xlabel('log [NII]/Ha')
        plt.ylabel('log [OIII]/Hb')
        cb = plt.colorbar()
        cb.set_label('O/H')
```




```
In [9]: N = MdB.count_dB(from_=OVN_dic['master_table'], where_="ref like 'PNe_2014'
        print("Total number of models with ref='PNe_2014': {}".format(N))
```

```
    MdB: Command sent: SELECT count(*) FROM `tab` WHERE (ref like 'PNe_2014')
Total number of models with ref='PNe_2014': 542950
```

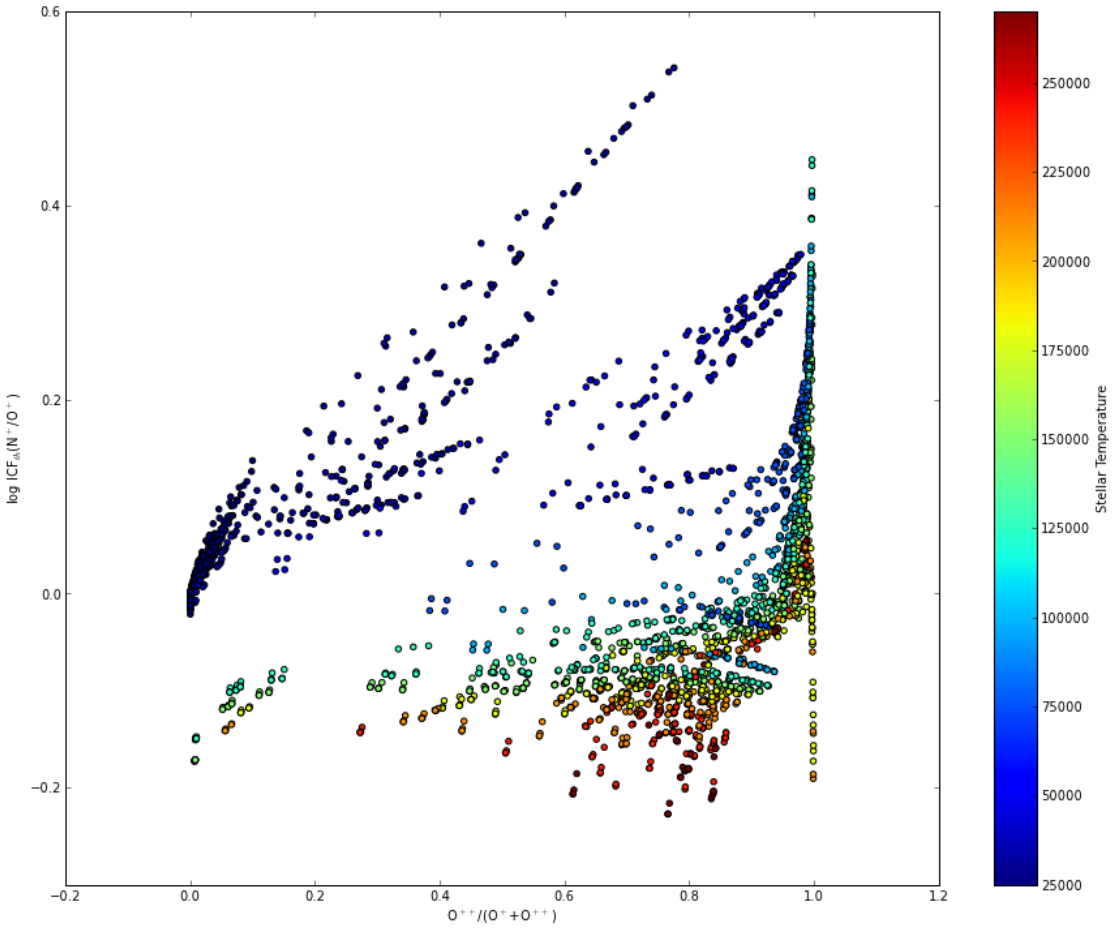
```
In [10]: # Query the database
         com1 = 'B' # Blackbody
         com2 = 'C' # Constant density
         com4 = 'S' # Solar metallicity
         com5 = 'N' # No dust
         com6 = 1 # selected models
         res, N = MdB.select_dB(select_='A_HYDROGEN_vol_1, A_HELIUM_vol_1, A_HELIUN
                                'A_NEON_vol_2, A_NEON_vol_4, A_SULPHUR_vol_1, A_SUI
                                'A_ARGON_vol_2, A_ZINC_vol_3, A_IRON_vol_2, A_NICKE
                                from_="{0}, {1}".format(OVN_dic['master_table'], OV
                                where_ = "{0}.ref like 'PNe_2014' and {0}.N = {1}.M
                                limit_=None, format_ = 'dict2')
```

```
MdB: Command sent: SELECT A_HYDROGEN_vol_1, A_HELIUM_vol_1, A_HELIUM_vol_2, A_
```

In [11]:
```
print(N)
```

```
3021
```

In [12]:
```
plt.figure(figsize=(15, 12))
plt.scatter(res['A_OXYGEN_vol_2']/(res['A_OXYGEN_vol_1']+res['A_OXYGEN_vol
                    np.log10(res['A_OXYGEN_vol_1']/res['A_NITROGEN_vol_1']), c
plt.xlabel(r'O$^{++}$/(O$^+$+O$^{++}$)')
plt.ylabel(r'log ICF$_{th}$(N$^+$/O$^+$)')
cb = plt.colorbar()
cb.set_label('Stellar Temperature')
```



In [11]: