

IRAF script for the calculation of overscan region for DANDICAM

```
hedit_("@infil",  
"ccdsec,datasec", "[1:2048,1026:2048]", _add=no, _delete=yes, _verify=no, _show=yes,  
update=yes)
```

```
hedit_("@infil",  
"datasec", "[1:2080,1:1024]", _add=yes, _delete=no, _verify=no, _show=yes,  
update=yes)
```

```
ccdproc_("@infil",  
ccdtype=" ", _max_cache=0, _noprocs=no, _fixpix=no, _overscan=yes, _trim=no,  
zerocor=no, _darkcor=no, _flatcor=no, _illumcor=no, _fringe=no, _readcor=no,  
scancor=no, _readaxis="line", _fixfile="", _biassec="[2038:2048,12:1024]",  
trimsec="image", _zero="", _dark="", _flat="", _illum="", _fringe="",  
minreplace=1., _scantype="shortscan", _nscan=1, _interactive=no,  
function="spline3", _order=10, _sample="*", _naverage=1, _niterate=1,  
low_reject=3., _high_reject=3., _grow=0.)
```

```
hedit_("@infil",  
"ccdsec,datasec,bt-flag", "[1:2080,1:1024]", _add=no, _delete=yes, _verify=no,  
show=yes, _update=yes)
```

```
hedit_("@infil",  
"datasec", "[1:2080,1026:2048]", _add=yes, _delete=no, _verify=no, _show=yes,  
update=yes)
```

```
ccdproc_("@infil",  
ccdtype=" ", _max_cache=0, _noprocs=no, _fixpix=no, _overscan=yes, _trim=no,  
zerocor=no, _darkcor=no, _flatcor=no, _illumcor=no, _fringe=no, _readcor=no,  
scancor=no, _readaxis="line", _fixfile="", _biassec="[2038:2048,1026:2038]",  
trimsec="image", _zero="", _dark="", _flat="", _illum="", _fringe="",  
minreplace=1., _scantype="shortscan", _nscan=1, _interactive=no,
```

```
function="spline3",_order=10,_sample="*",_naverage=1,_niterate=1,
low_reject=3.,_high_reject=3.,_grow=0.)

hedit_("@infil",
"ccdsec,datasec",_ "[1:2080,1:1024]",_add=no,_delete=yes,_verify=no,
show=yes,_update=yes)

hedit_("@infil",
"datasec",_ "[1:2080,1:2048]",_add=yes,_delete=no,_verify=no,_show=yes,
update=yes)

hedit_("@infil",
"ccdsec",_ "[1:2080,1:2048]",_add=yes,_delete=no,_verify=no,_show=yes,
update=yes)
```

Each line is a command that would be entered into the **IRAF** command line. Each of the two CCDs' overscan is fitted separately and then the entire image is declared to be the usable part from pixel 1 to 2080 on the x-axis and 1 to 2048 on the y-axis. In each command a single file with the name „@infil” is addressed, this is a text file containing the names of all of the files that the selected operation in the task should be executed on.

Script for calculation of average background value

```

clear
ccddata=_load('ccd512.0368_t0.dat');
[nr,nc]=_size_(ccddata);
nr
nc
sum=_0;
sum2=_0;
min=_1.0e+09;
max=_1.0e-09;
for_i=1:nr
for_j=1:nc
a=_ccddata(i,j);
sum=_sum+_a;
sum2=_sum2+_a*a;
if_a<_min
min=_a;
end
if_a>_max
max=_a;
end
endfor
endfor
sum
sum2
gem=_sum/(nr*nc)
var=_sum2/(nr*nc)-_gem*_gem
stdev=_sqrt(var)
min
max
xmin=_10*_floor(min/10)
xmax=_gem+_5*_stdev

```

```
nbin=_floor(xmax-xmin)+1
hist=_zeros(nbin,1);
sum=0;
for_i=_1:nr
  _for_j=_1:nc
    _a=_ccddata(i,j);
    _index=_floor(a-xmin)+_1;
    _if(index<_nbin)
      _sum++;
      _hist(index)++;
    _end
  _endfor
endfor
j=_0;
x=_zeros(2*nbin,1);
y=_zeros(2*nbin,1);
for_i=1:nbin
  x(2*i-1)=_xmin+_1(i-1);
  if(i==_1)
    _y(2*i-1)=_0;
  _else
    _y(2*i-1)=_hist(i-1);
  end
  x(2*i)=_xmin+_1(i-1)*1;
  y(2*i)=_hist(i);
endfor
newhist=_[x,y/sum];
plot(x,y/sum)
save("image368.dat","newhist")
```

C++ program for recursively finding matching sources between optical and NIR sources

```

#include<iostream>
#include<fstream>
#include<cmath>
#include<iomanip>

using namespace std;
using std::ifstream;

int main(int argc, char* argv[])
{
    ifstream coord("RCW34ri.dat", ios::in);
    ifstream nifra("G264_colorcalibjkh.dat", ios::in);
    ofstream multiw("RCW34rijhk.X.dat");

    if(!coord)
    {
        cout<<<"Die leer met die koördinate vir die optiese data kan nie gelees word nie!"<<<endl;
        return(1);
    }

    if(!nifra)
    {
        cout<<<"Die leer met die magnitudes vir die naby-infrarooi data kan nie gelees word nie!"<<<endl;
        return(1);
    }

    double coo[215][6]; //ra, dec, v, dv, r, dr, i, di
    double nir[1283][12]; //ra, dec, jmag, djmag, hmag, dhmag, kmag, dkmag, jmag-hmag, hmag-kmag

```

104 Appendix C. C++ program for recursively finding matching sources between optical and NIR sources

```
double_multi[215][12];
double_shortdistance=1000.0;
double_distance=0.0;
double_mindec, maxdec, minrad, maxrad;

/*****Invoer_vanuit_die_twee_data_leers*****/

for(int k=0; k<215; k++)
{
    coord>>coo[k][0]>>coo[k][1]>>coo[k][2]>>coo[k][3]>>coo[k][4]>>coo[k][5];
    // coo[k][0]=coo[k][0]-0.001;
    cout<<coo[k][0]<<" "<<coo[k][1]<<" "<<coo[k][2]<<" "<<coo[k][3]<<" "<<coo[k][4]<<" "<<coo[k][5]<<endl;
}

cout<<endl;

cout<<"Optical_data_read_fine!"<<endl;

cout<<endl;

for(int j=0; j<1283; j++)
{
    nifra>>nir[j][0]>>nir[j][1]>>nir[j][2]>>nir[j][3]>>nir[j][4]>>nir[j][5]>>nir[j][6]>>nir[j][7];
    // cout<<nir[j][0]<<" "<<nir[j][1]<<" "<<nir[j][2]<<" "<<nir[j][3]<<" "<<nir[j][4]<<" "<<nir[j][5]<<" "<<nir[j][6]<<" "<<nir[j][7]<<endl;
}

cout<<endl;

cout<<"Infra_red_data_read_fine"<<endl;

cout<<endl;

minrad=nir[0][0];
maxrad=nir[1][0];
mindec=nir[0][1];
maxdec=nir[1][1];

for(int h=0; h<1283; h++)
```

```

    {}
    {}if(_nir[h][0]<_minrad_)
    {}
    {}minrad=_nir[h][0];
    {}

    {}if(_nir[h][0]>_maxrad_)
    {}
    {}maxrad=_nir[h][0];
    {}

    {}if(_nir[h][1]<_mindec_)
    {}
    {}mindec=_nir[h][1];
    {}

    {}if(_nir[h][1]>_maxdec_)
    {}
    {}maxdec=_nir[h][1];
    {}
    {}

//cout<<endl;

cout<<"mindec="<<mindec<<endl;
cout<<"maxdec="<<maxdec<<endl;
cout<<"minrad="<<minrad<<endl;
cout<<"maxrad="<<maxrad<<endl;

/*****Dataverwerking_endie_uitwerking_van_afstande_tussen_punte*****/
/*****/Die_rads_endecsis_in_coord[k][2],[3]_en_nir[j][0],[1]*****/

int_indeks=0;

for(int_i=0;i<215;i++)
{}
//{}if((_coo[i][0]>=134.027_)&(_coo[i][0]<=134.194_)&(_coo[i][1]>=134.194_)&(_coo[i][1]<=134.027_))
{}if((_coo[i][0]>=_minrad_)&(_coo[i][0]<=_maxrad_)&(_coo[i][1]>=_mindec_)&(_coo[i][1]<=_maxdec_))
{}
{}shortdistance=1000.0;

```

10 Appendix C. C++ program for recursively finding matching sources between optical and NIR sources

```

        //distance=9000.9;
        indeks=-1;
        for(int j=0; j<1283; j++)
        {
            distance=sqrt(pow(coo[i][0]-nir[j][0],2)+pow(coo[i][1]-nir[j][1],2));
            if(distance!=0.0)
            {
                if(distance<shortdistance)
                {
                    shortdistance=distance;
                    indeks=j;
                }
            }
            else if(distance==0.0)
            {
                indeks=j;
            }
        }
        if(multi[i-1][0]!=0)
        {
            cout<<"*";
            multi[i][0]=coo[i][0]; //Rads
            multi[i][1]=coo[i][1]; //Decs
            multi[i][2]=coo[i][2]; //R
            multi[i][3]=coo[i][3]; //dR
            multi[i][4]=coo[i][4]; //I
            multi[i][5]=coo[i][5]; //dI
            multi[i][6]=nir[indeks][2]; //J
            multi[i][7]=nir[indeks][3]; //dJ
            multi[i][8]=nir[indeks][4]; //H
            multi[i][9]=nir[indeks][5]; //dH
            multi[i][10]=nir[indeks][6]; //K
            multi[i][11]=nir[indeks][7]; //dK
        }
        else if(multi[i-1][0]==0)
        {
            cout<<"-";
            multi[i][0]=coo[i][0]; //Rads
            multi[i][1]=coo[i][1]; //Decs
            multi[i][2]=coo[i][2]; //R

```

```

        multi[i][3]=_coo[i][3];_//dR
        multi[i][4]=_coo[i][4];_//I
        multi[i][5]=_coo[i][5];_//dI
        multi[i][6]=_nir[indeks][2];_//J
        multi[i][7]=_nir[indeks][3];_//dJ
        multi[i][8]=_nir[indeks][4];_//H
        multi[i][9]=_nir[indeks][5];_//dH
        multi[i][10]=_nir[indeks][6];_//K
        multi[i][11]=_nir[indeks][7];_//dK

    }
    cout<<_multi[i][0]<<" "<<_multi[i][1]<<" "<<_multi[i][2]<<" "<<_multi[i][3]

}
}
cout<<_endl;

/*****Uitvoer_na_teksleer_van_magnitudes*****/

for(_int_i=0;_i<_215;_i++)
{
    cout<<_multi[i][0]<<" "<<_multi[i][1]<<" "<<_multi[i][2]<<" "<<_multi[i][3]
    multiw.precision(12);
    multiw<<_multi[i][0]<<" ";_//Rads
    multiw<<_multi[i][1]<<" ";_//Decs
    multiw<<_multi[i][2]<<" ";_//R
    multiw<<_multi[i][3]<<" ";_//dR
    multiw<<_multi[i][4]<<" ";_//I
    multiw<<_multi[i][5]<<" ";_//dI
    multiw<<_multi[i][6]<<" ";_//J
    multiw<<_multi[i][7]<<" ";_//dJ
    multiw<<_multi[i][8]<<" ";_//H
    multiw<<_multi[i][9]<<" ";_//dH
    multiw<<_multi[i][10]<<" ";_//K
    multiw<<_multi[i][11]<<" ";_//dK
    multiw<<_endl;
}

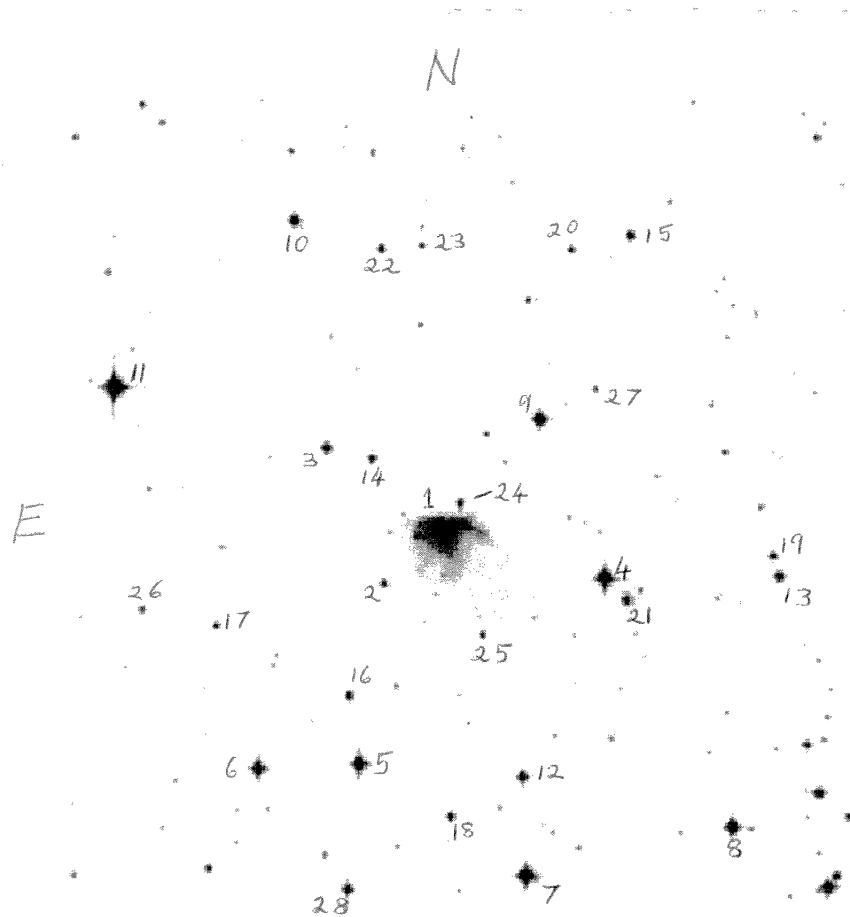
multiw.close();

```

```
return_0;  
}
```

Spectral profiles for all of the stars that were observed in 2002

The stars that were chosen as spectral candidates in 2002 are given in the following image. These stars were selected by Prof D.J. Van der Walt in their position relative to the HII region and practicality of observing the stars.



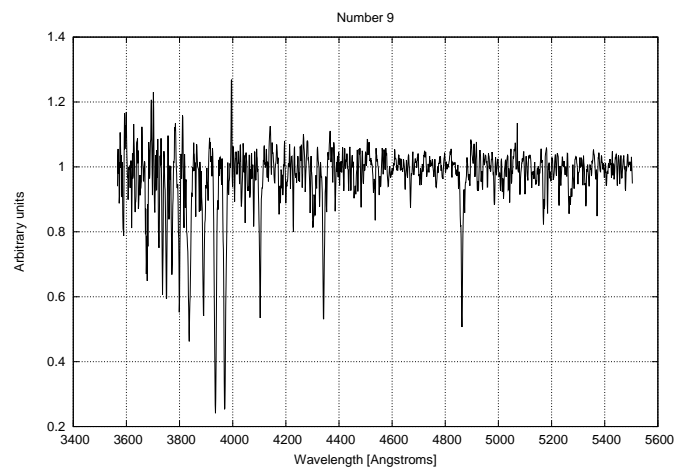
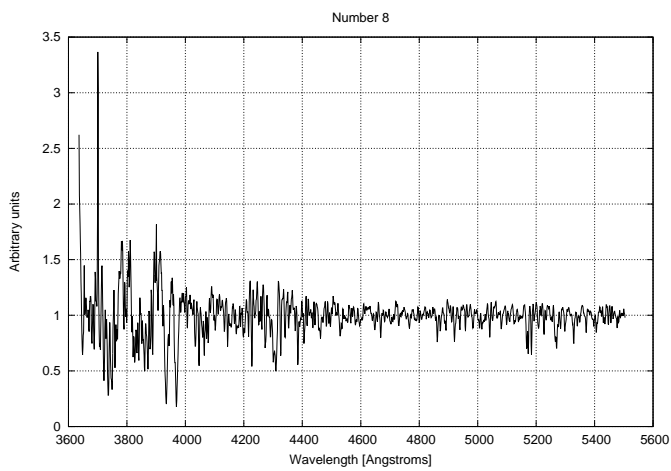
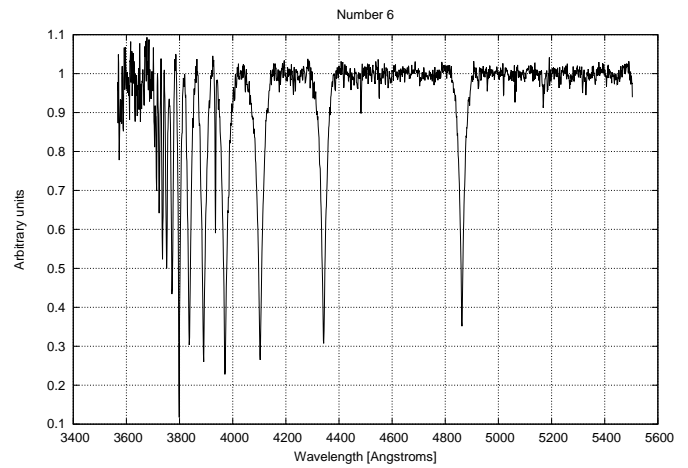
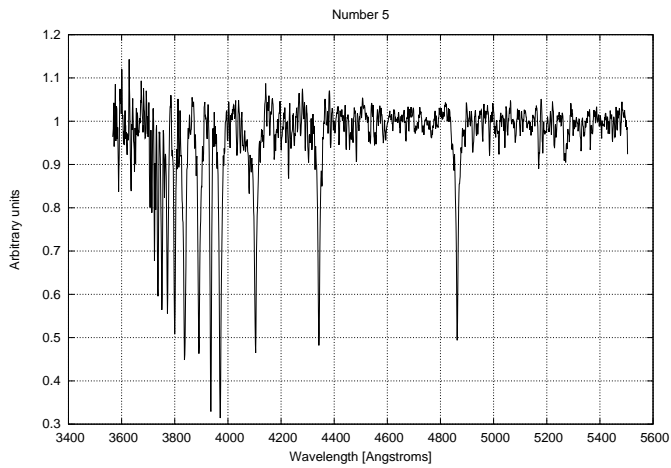
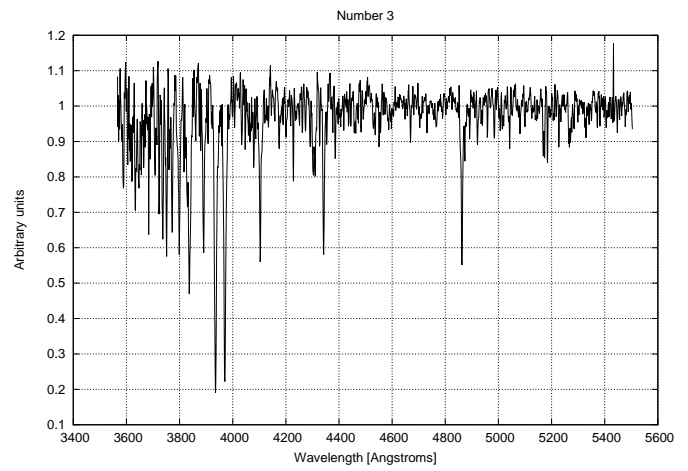
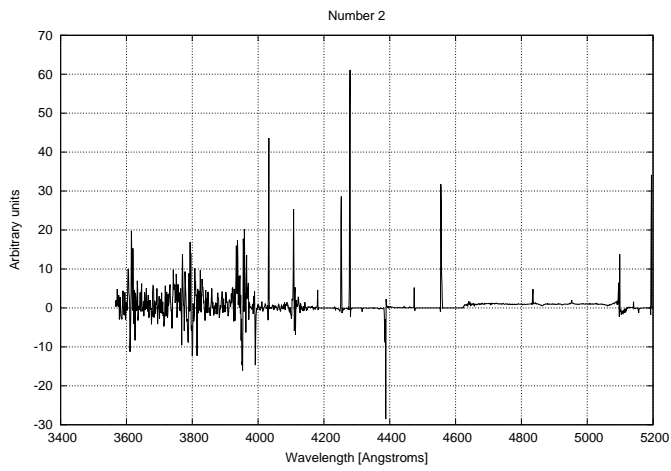
○ **Image information**

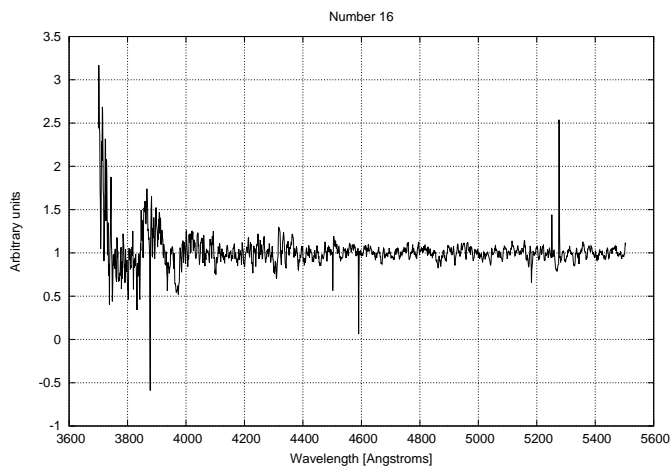
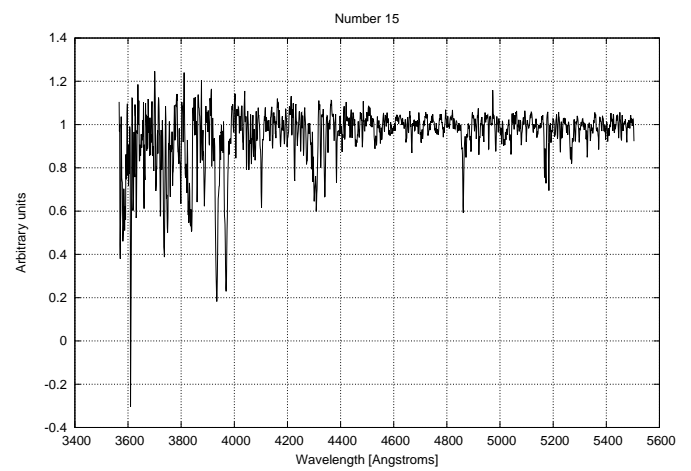
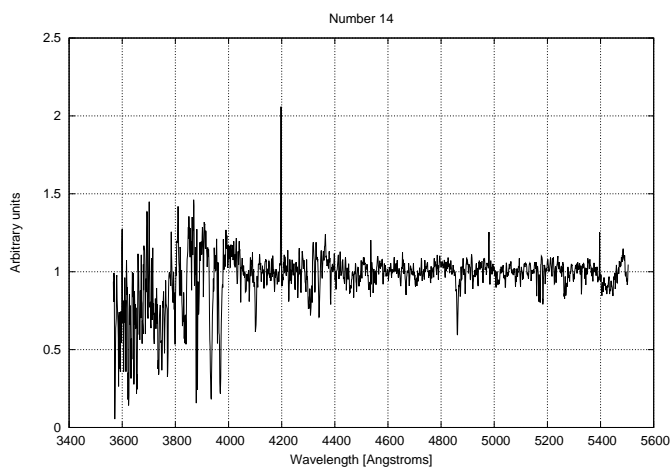
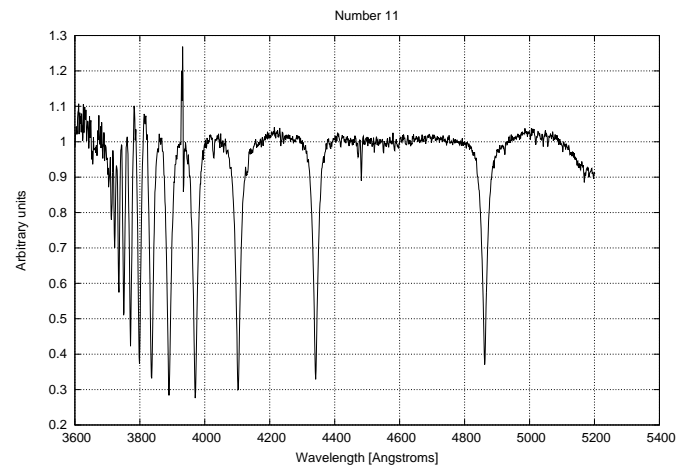
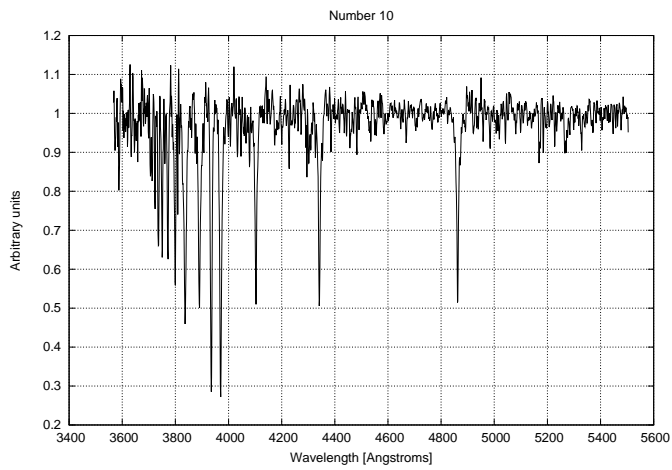
Field centre 08h56m27.00s, -43d05m41.00s (2000.0)

Pixel size 1.7"

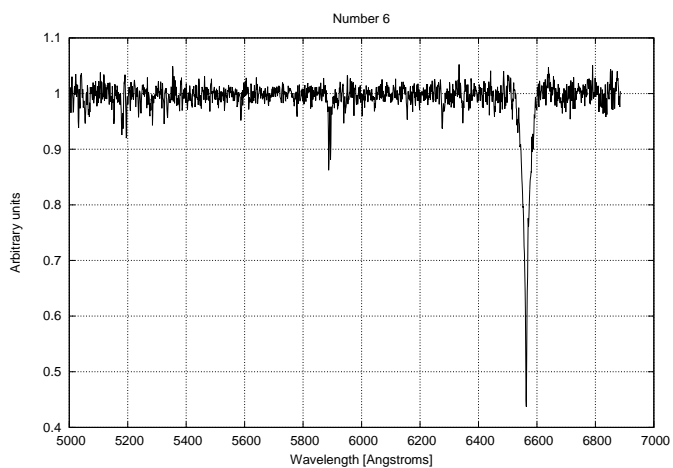
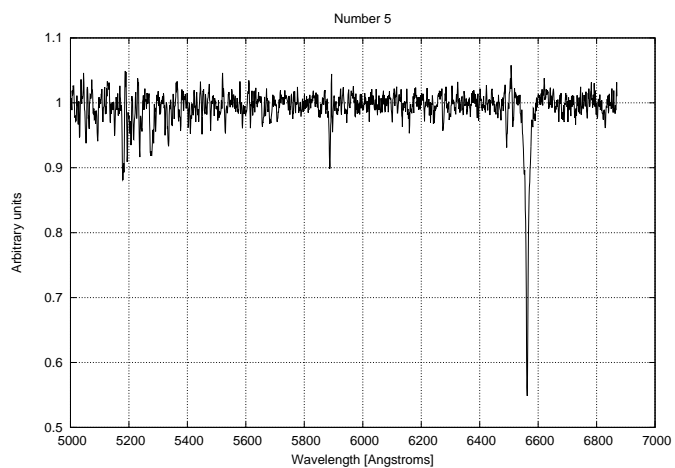
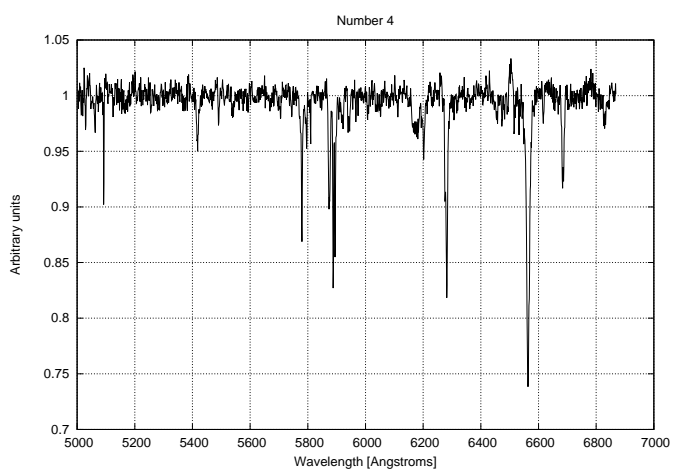
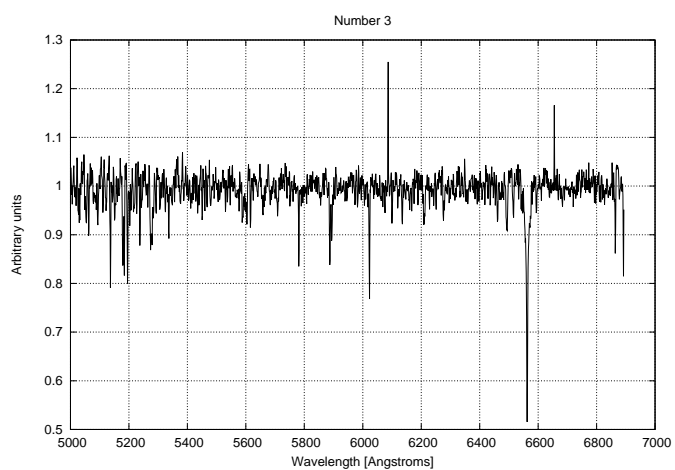
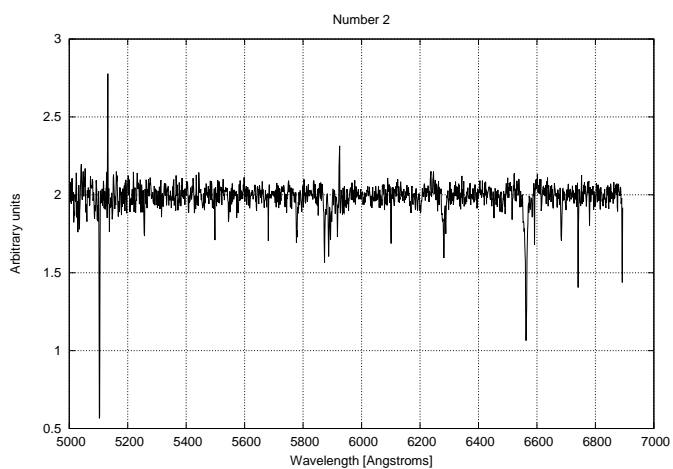
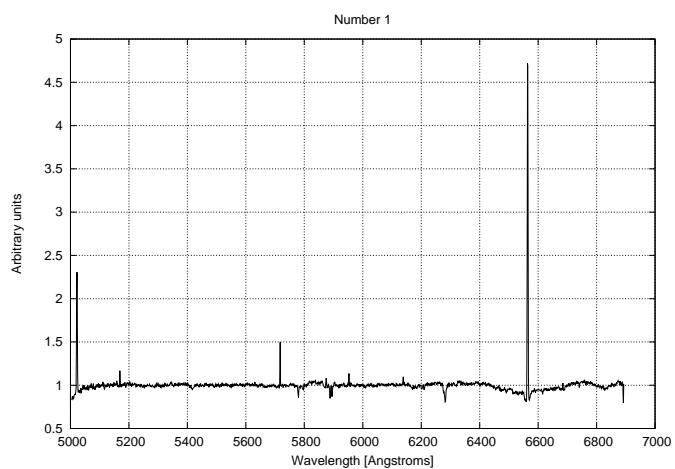
Projection: tangent plane

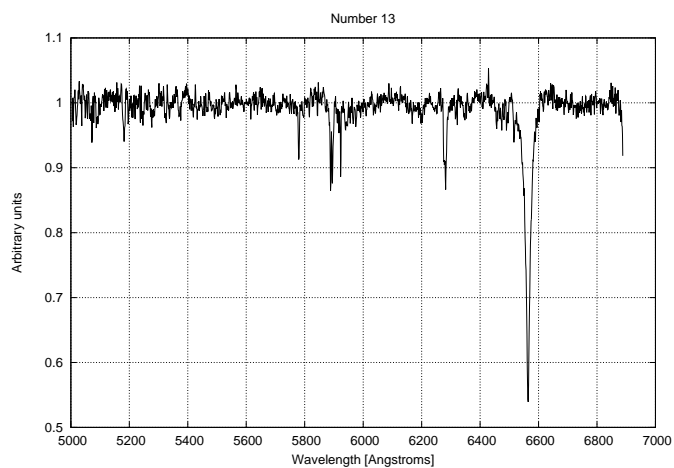
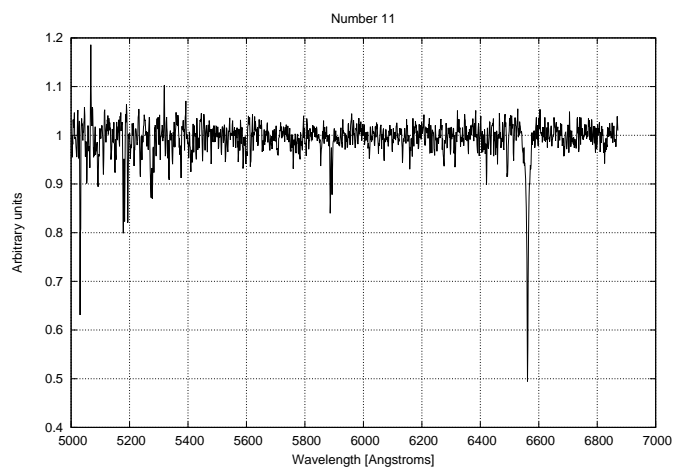
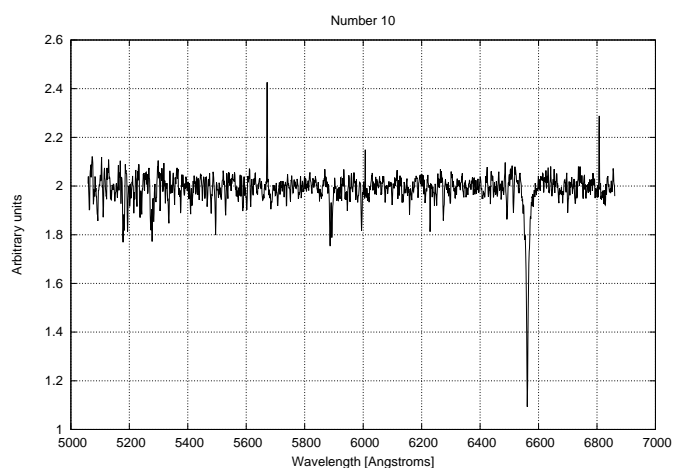
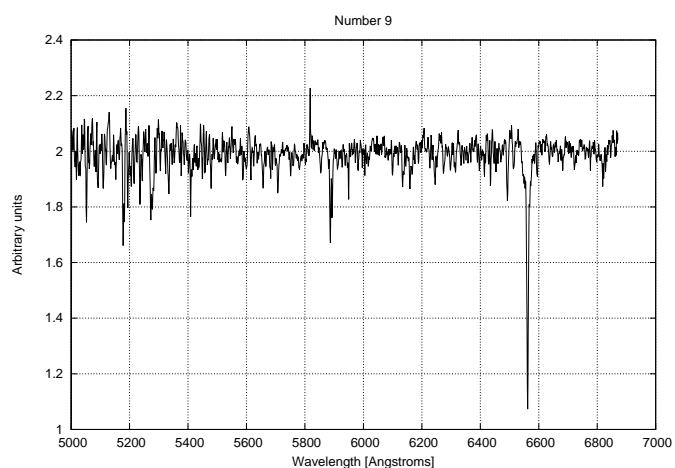
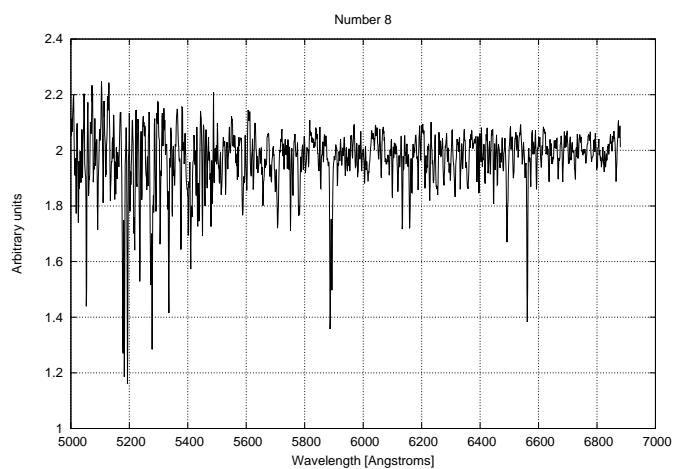
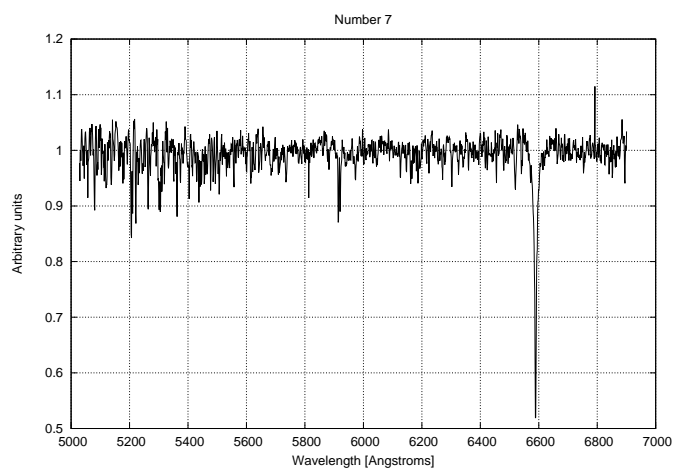
D.1 Blue part of the spectrum

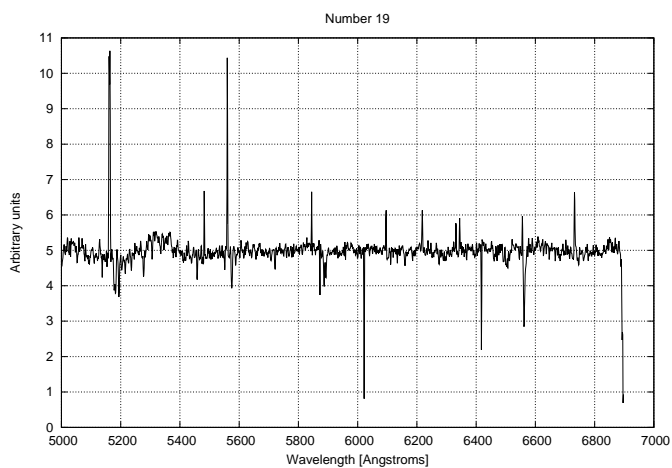
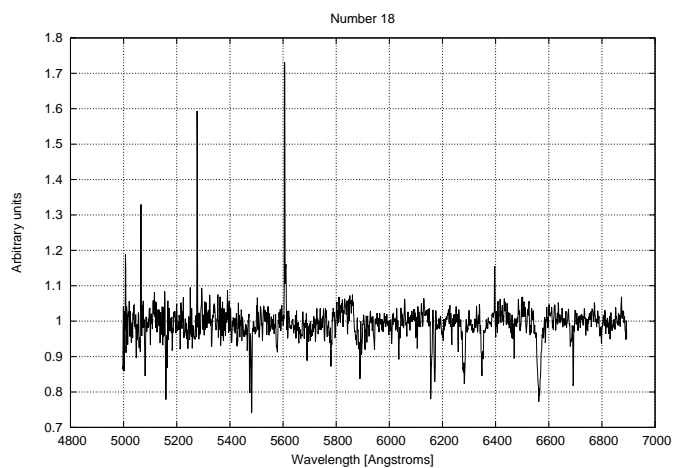
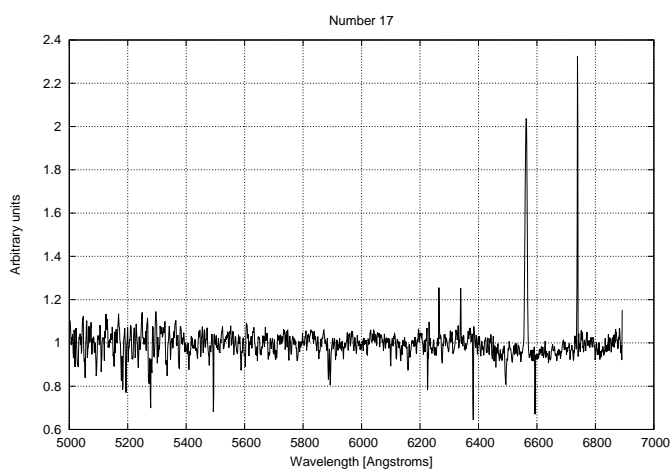
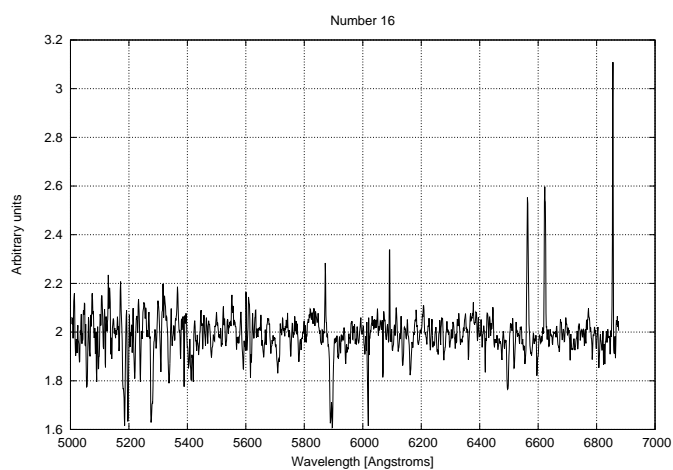
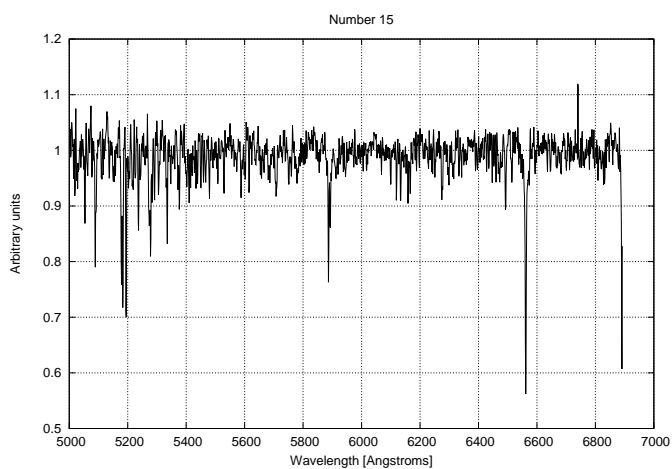
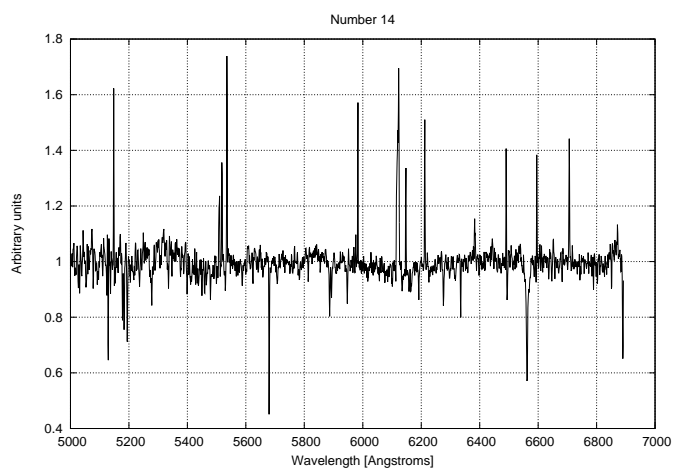


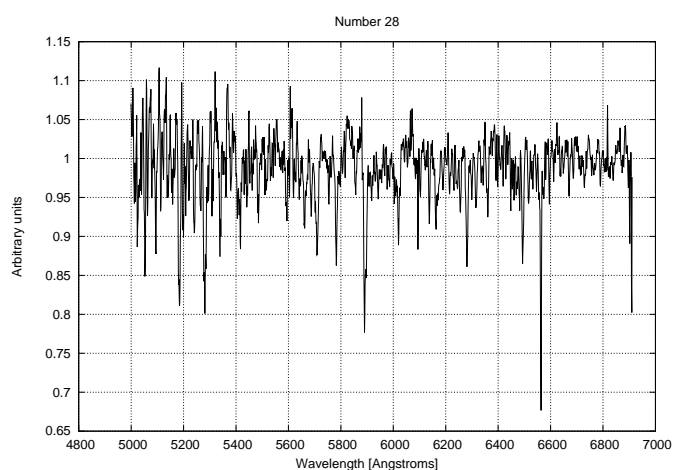
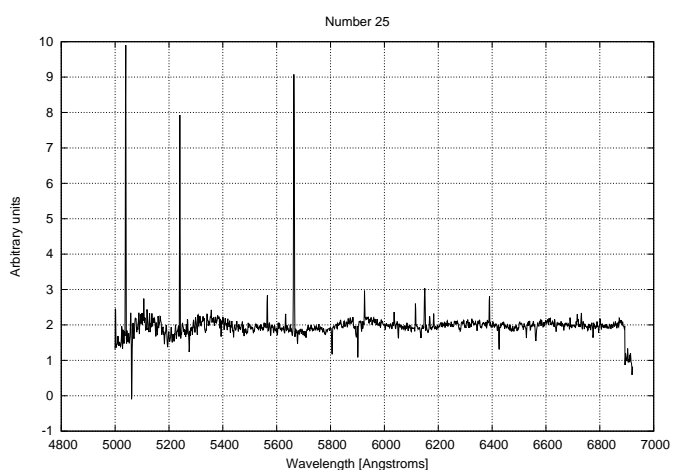
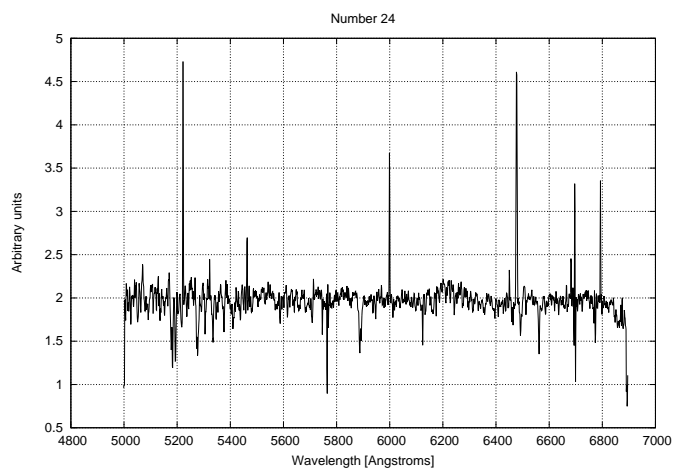
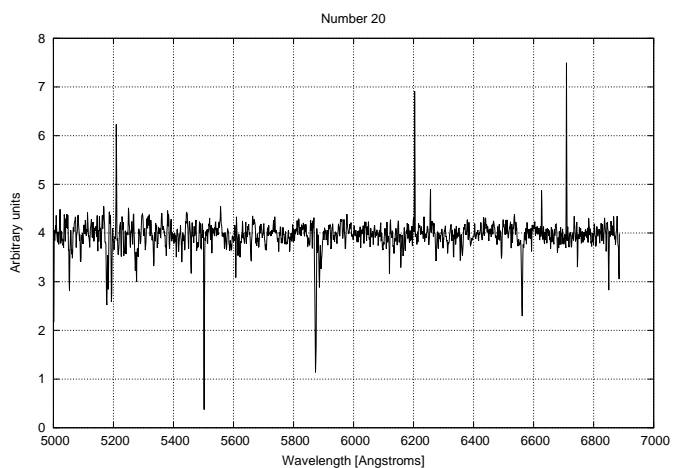


D.2 Red part of the spectrum



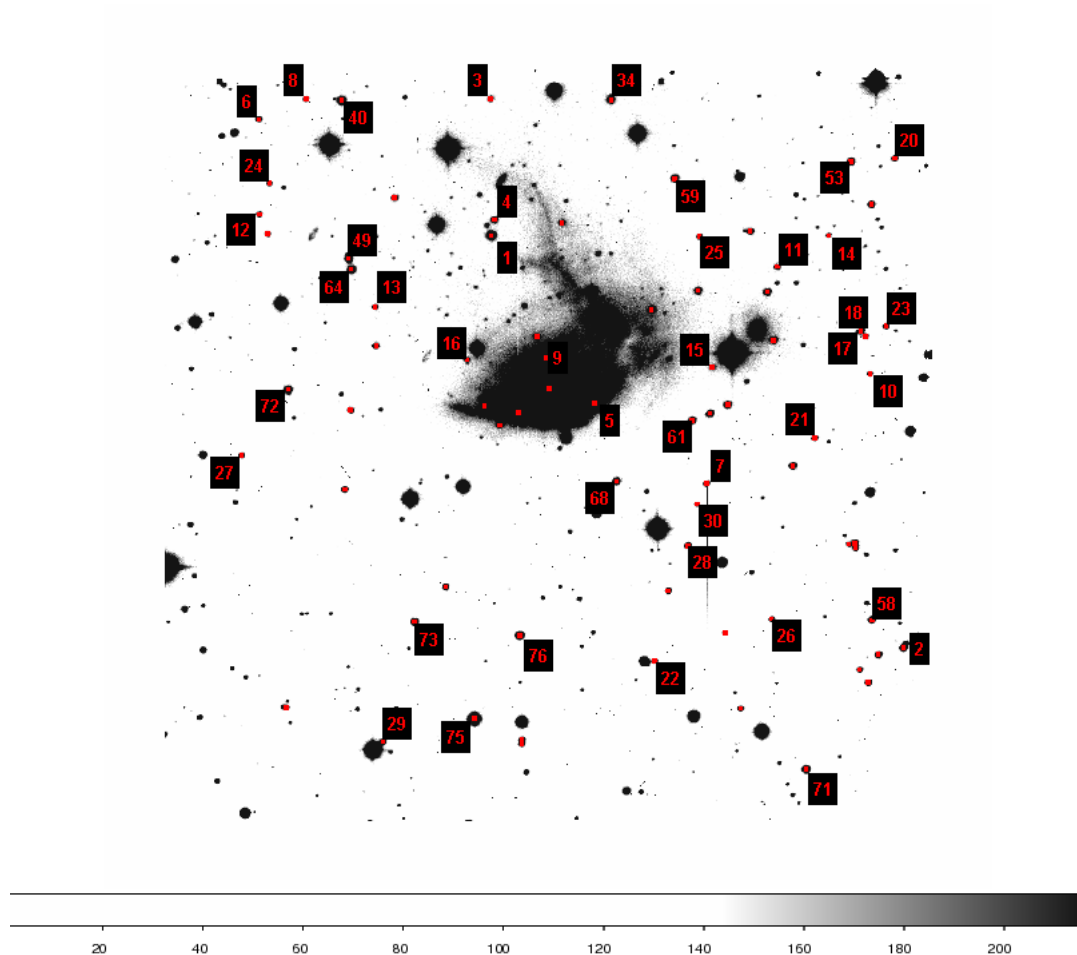


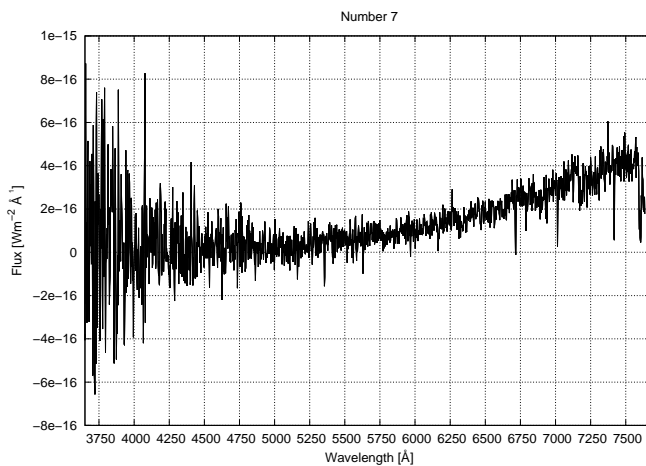
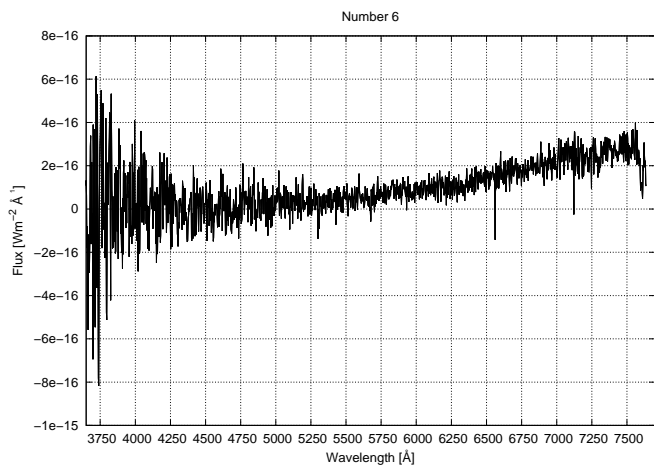
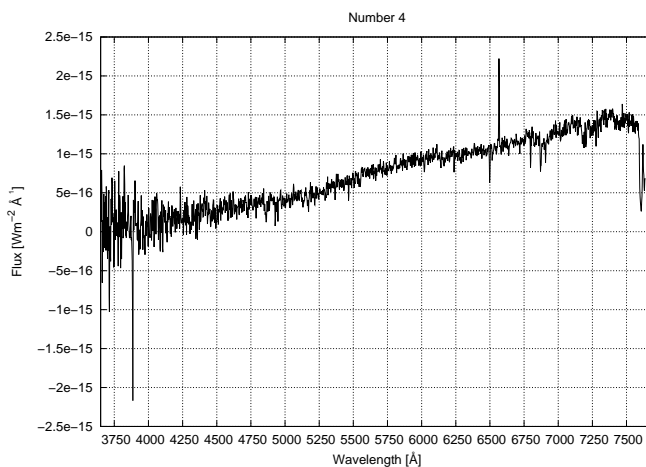
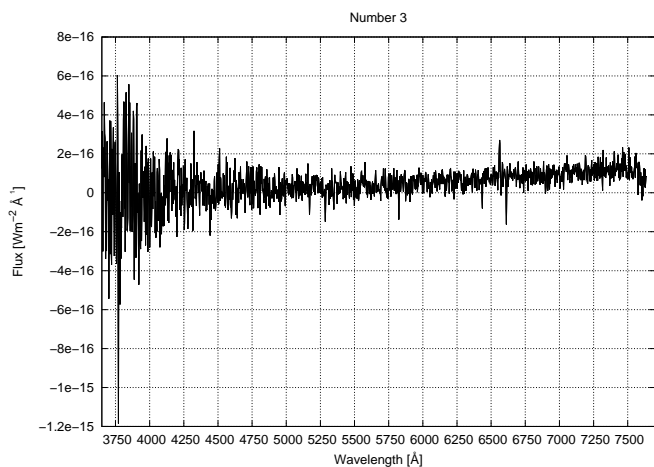
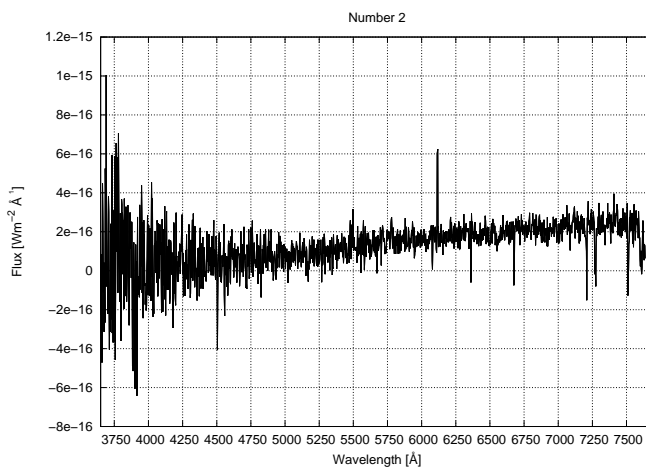
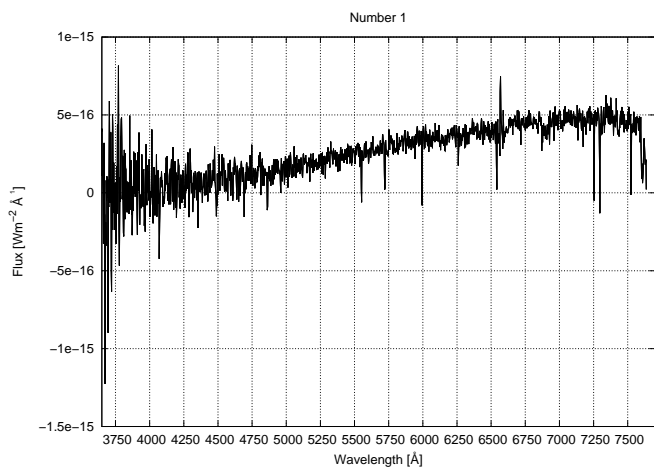


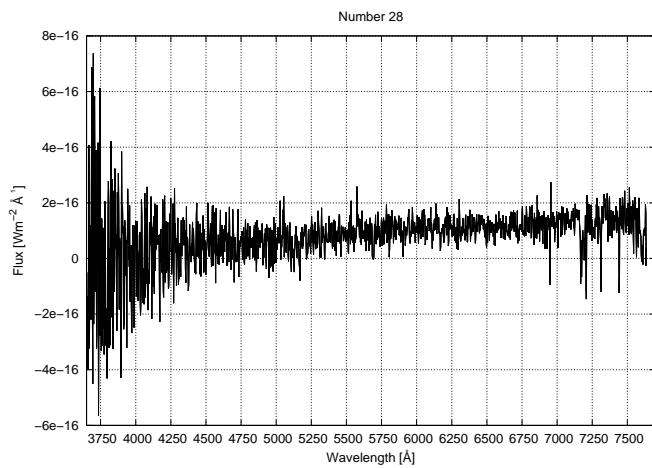
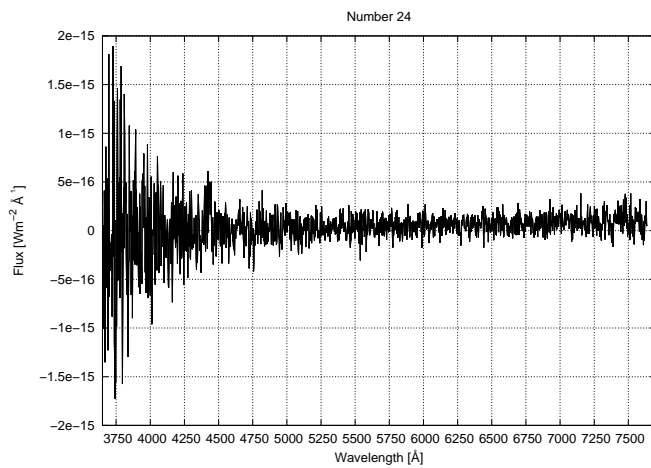
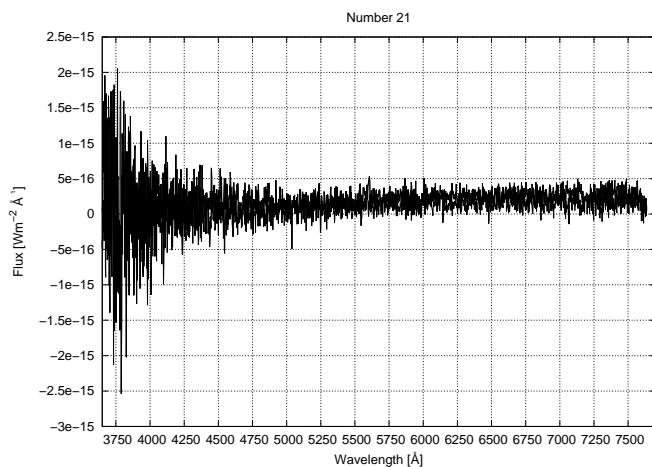
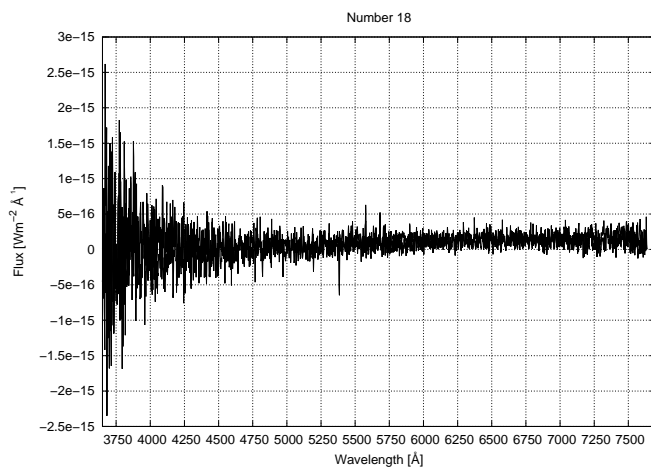
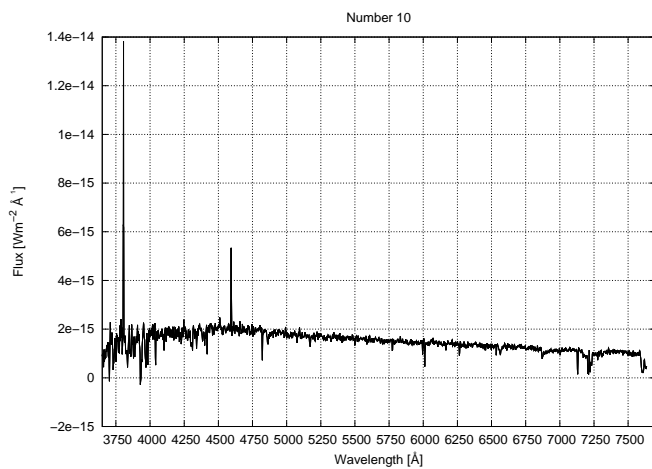
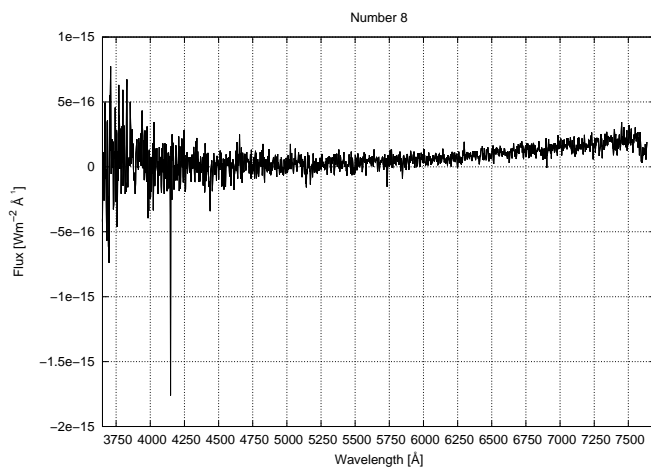


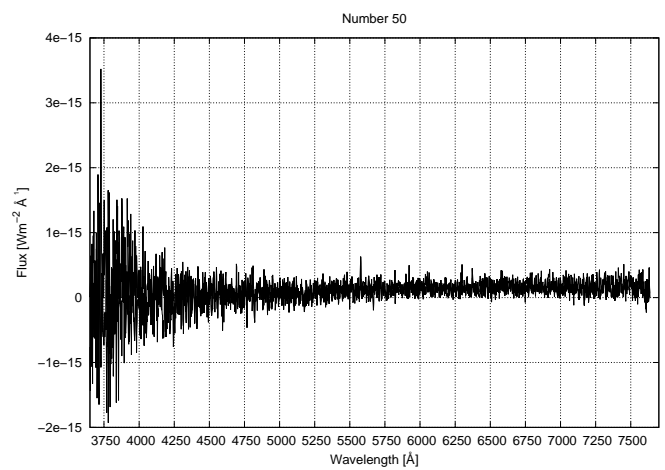
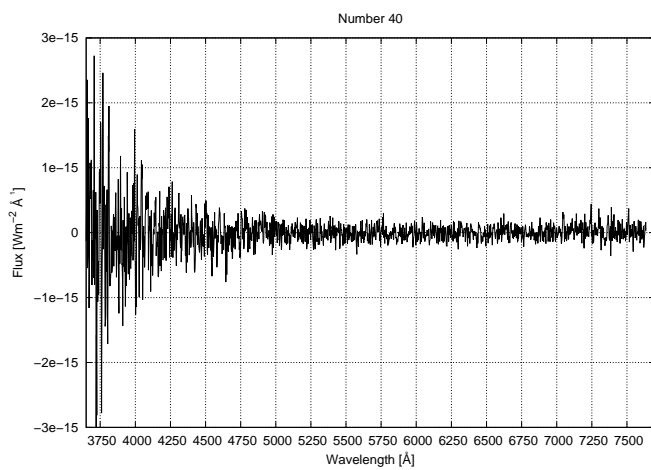
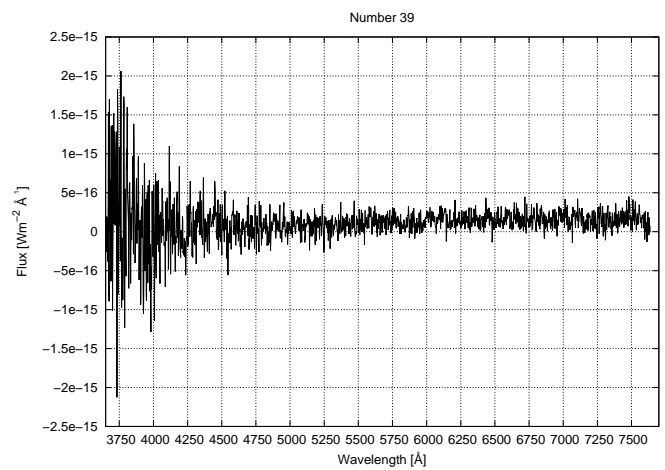
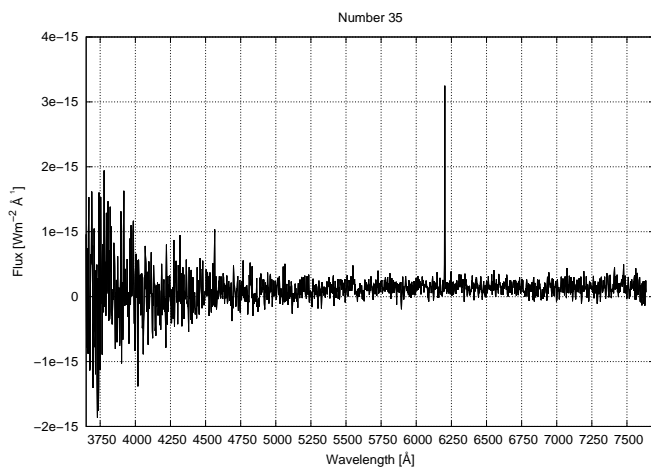
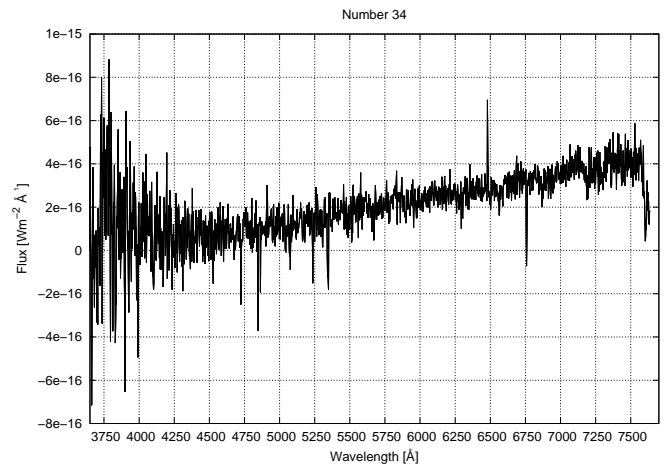
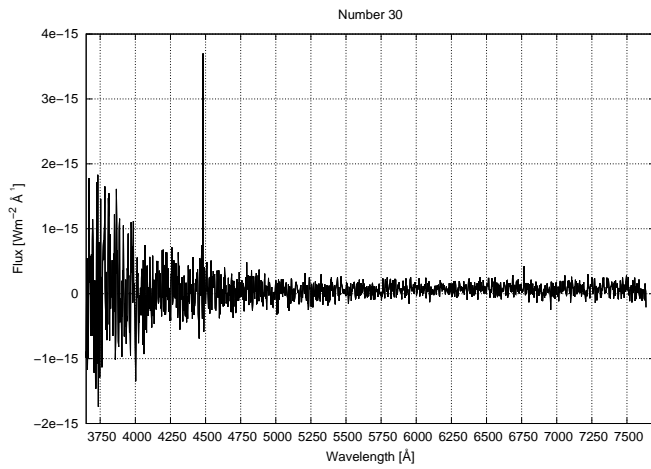
Spectral profiles for all of the stars that were observed in 2002

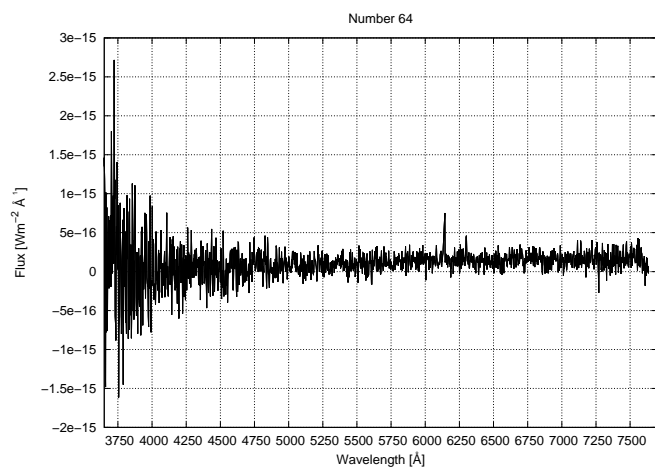
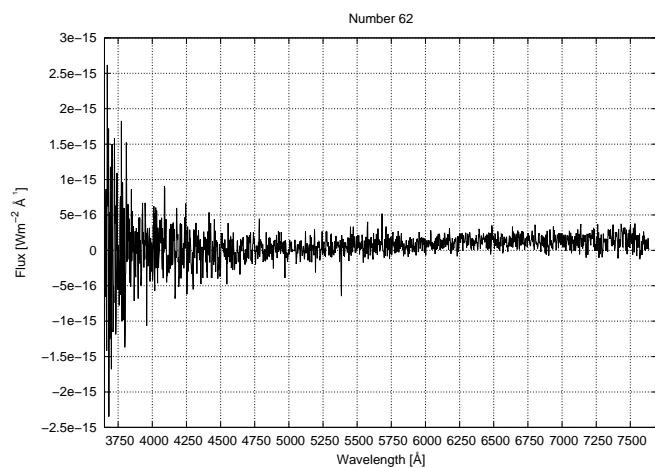
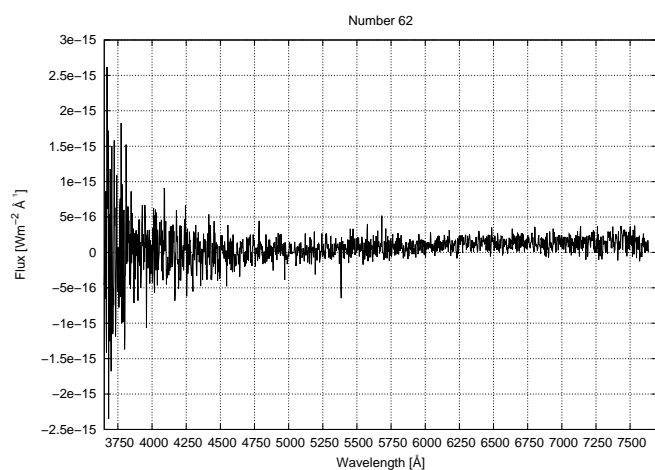
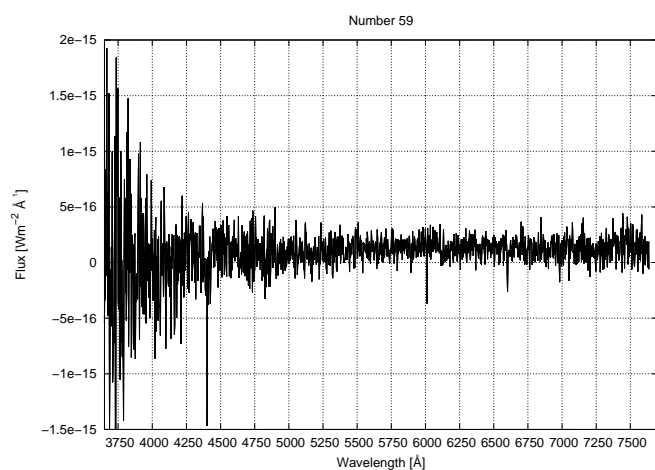
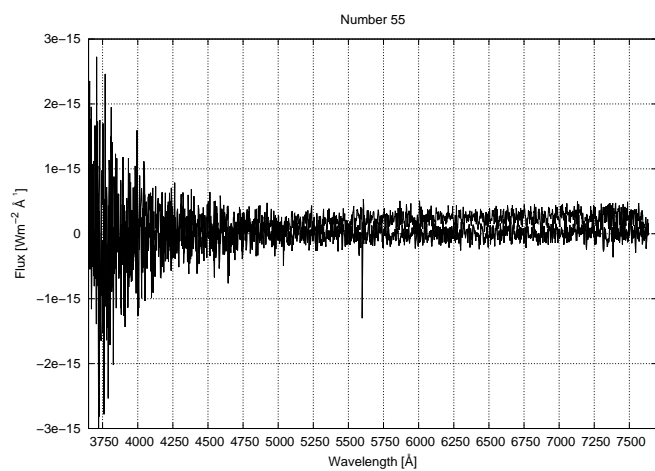
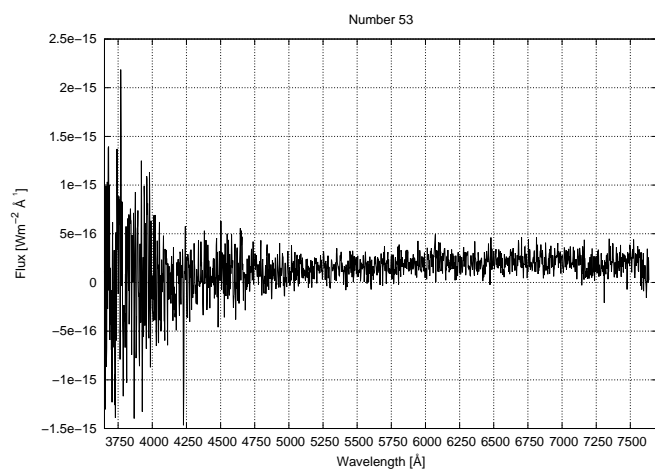
The stars that were chosen as spectral candidates in 2011 are given in the following image. These candidates were chosen according to the magnitude of their $H - K$, using the highest magnitude as the highest priority and the moving to the lower values. The higher the $H - K$ magnitude the higher the probability would be for the star to have an accretion disc.

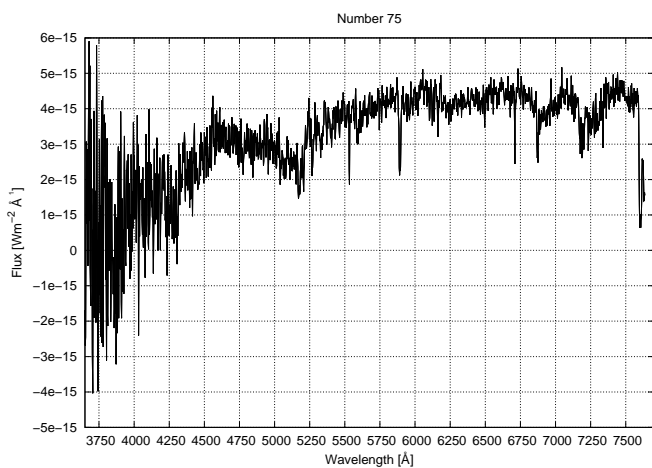
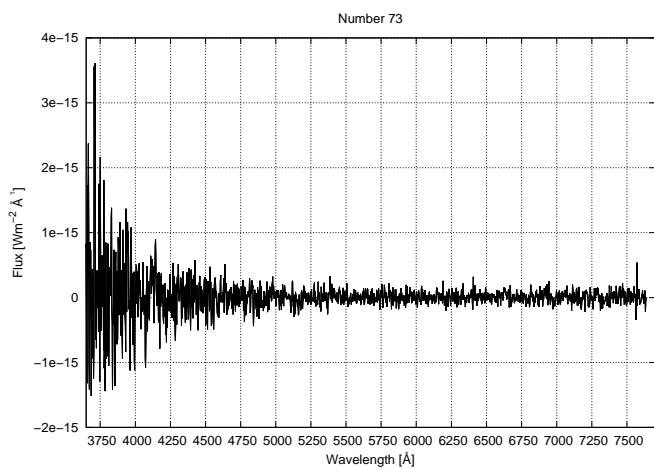
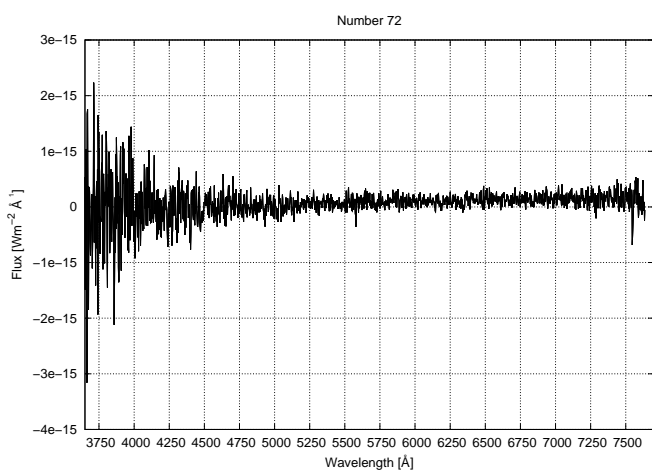
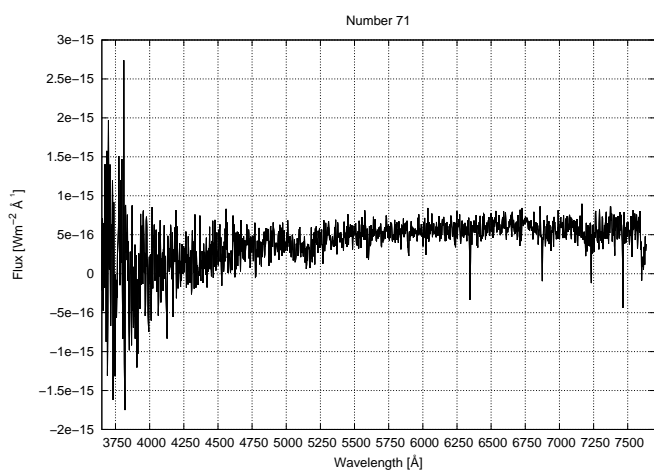
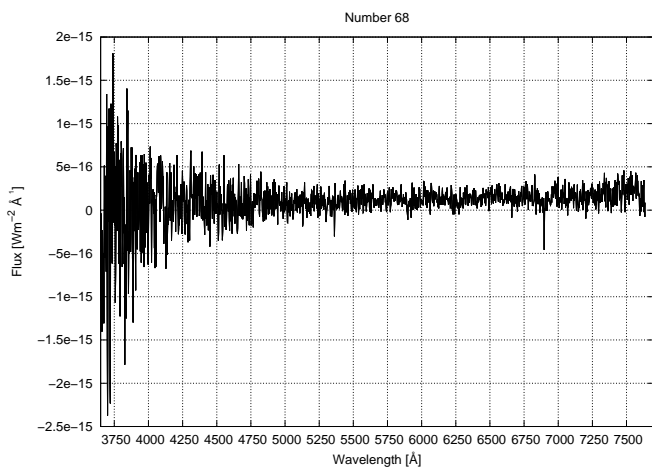
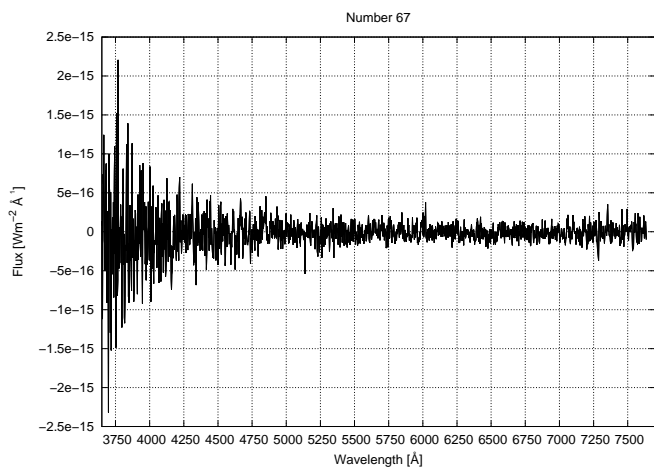


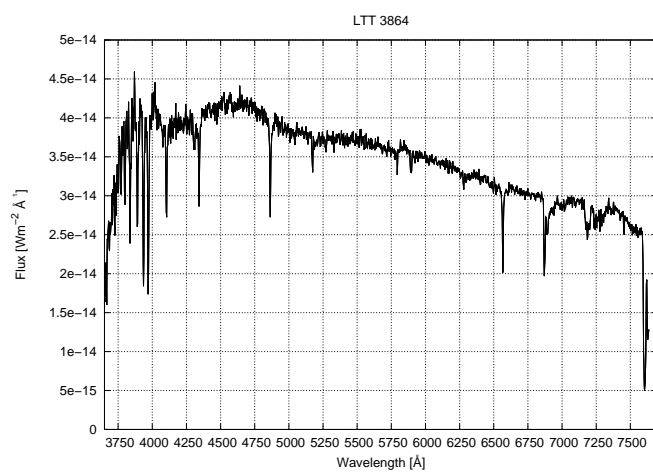












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