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# CORRECTION OF DUST EXTINCTION IN MILKY WAY
#
# This Python script is calculating the correction for the dust extinction
# in the Milky Way to apply to line fluxes in distant galaxies. It reads
# fluxes
# in one file and extinction law of the Milky Way in another file. Results
# with
# extinctions are saved in another file.
#
#
z,av_mw=loadtxt('sample_dust_mw.txt', unpack = True, usecols=(1,2))
l_ext,k_l=loadtxt('GALEXT.DAT', unpack= True, usecols = (0,1))
#
print ('Number of galaxies = %d' % z.size)
#
l_o20 = 3727.4
l_hb0 = 4861.33
l_ha0 = 6562.82
#
#
l_o2 = (1+z)*l_o20
l_hb = (1+z)*l_hb0
l_ha = (1+z)*l_ha0
#
#
# Finds extinction for [OII]
#
k_o2=ndarray((z.size))      # opens array with 21 elements
#
xmin=30000.0
xpos=0
for i in range(0,l_o2.size):
    for j in range(0,l_ext.size):
        xx=abs(l_ext[j]-l_o2[i])
        if (xx < xmin):
            xmin=xx
            xpos=j
    k_o2[i]=k_l[xpos]
print ('Dust extinction correction for [OII]:',k_o2)
#
# Finds extinction for H-beta
#
k_hb=ndarray((21))      # opens array with 21 elements
#
xmin=30000.0
xpos=0
for i in range(0,l_hb.size):
    for j in range(0,l_ext.size):
        xx=abs(l_ext[j]-l_hb[i])
        if (xx < xmin):
            xmin=xx
            xpos=j
    k_hb[i]=k_l[xpos]
print ('Dust extinction correction for H-beta:',k_hb)
#
#
# Finds extinction for H-alpha
#
k_ha=ndarray((21))
#
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xmin=30000.0
xpos=0
for i in range(0,l_ha.size):
    for j in range(0,l_ext.size):
        xx=abs(l_ext[j]-l_ha[i])
        if (xx < xmin):
            xmin=xx
            xpos=j
    k_ha[i]=k_l[xpos]
print ('Dust extinction correction for H-alpha:', k_ha)
#
sample=ndarray((21,4))
sample[:,0]=z
sample[:,1]=k_o2
sample[:,2]=k_hb
sample[:,3]=k_ha
#
savetxt("Gal_ext.txt",sample)
```