Ex2

March 27, 2025

1. Importing

What we did in this section:

- Import Python libraries.

```
import numpy as np
import matplotlib.pyplot as plt
from astropy.io import fits
from astropy.table import Table
from astropy import units as u
plt.ion()
import os
```

2. Units

- We used Astropy units u to define physical quantity

```
a = 50.0 * u.meter
b = [23, 45, 88] * u.meter
print(a)
print(b)
```

3. Average (mean) of units

```
np.mean(b)
```

This is how we get the average value of our quantity.

4. Arithmetic operations

```
15 * u.meter / (3 * u.second)
```

5. Distance to SMC and LMC in parsecs and their ratio

```
x = 62 * u.parsec
print(x)
```

```
y = 45 * u.parsec
x/y
```

6. Extraction of numerical values (no units)

```
z = x.value
z


z = x.value / y.value
z
```

7. Rounding results

```
np.around(z, decimals=2)
```

8. Speed

Here we calculated the speed using arrays of distances and corresponding to them times

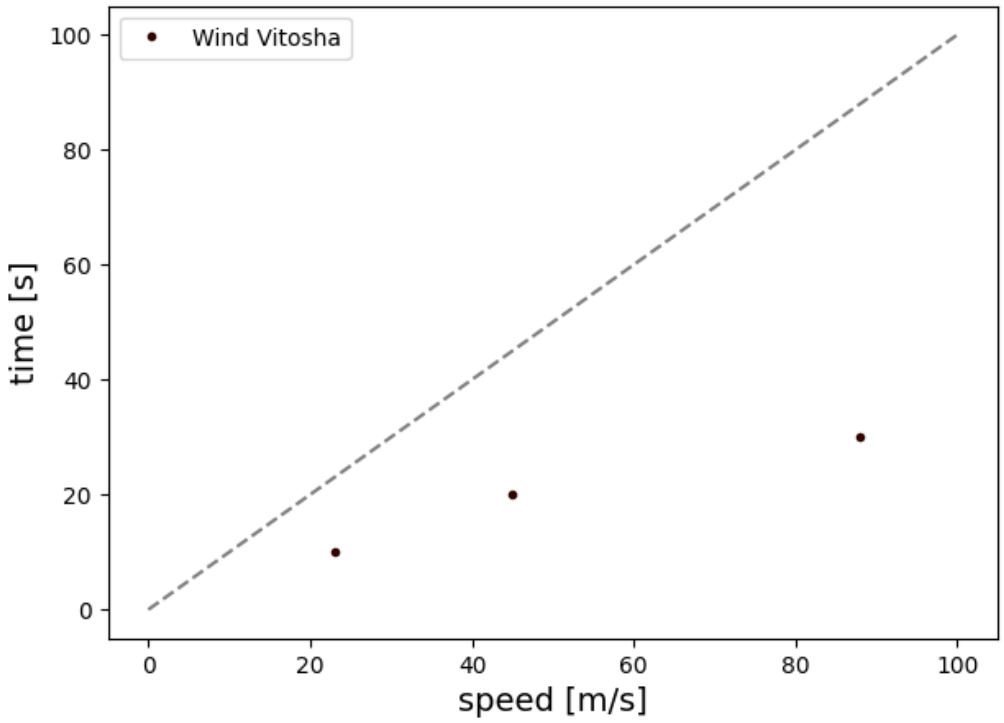
```
time = [1, 1, 1] * u.second
print (time)
speed = b/time
print(speed)
```

9. Wind speed

Finally what we did is a plot, showing the relationships between time and wind speed from the previous exercise.

```
plt.figure(figsize=(7,5))
plt.plot(speed, [10, 20, 30], ls='', color='#300500', marker='.', label='Wind
Vitosha')
plt.xlabel("speed [m/s]", fontsize=14)
plt.ylabel("time [s]", fontsize=14)
plt.legend()

l1 = np.linspace(0, 100, 2)
l2 = np.linspace(0, 100, 2)
plt.plot(l1, l2, color='gray', ls='--')
```


Wind Vitosha
time [s]
speed [m/s]
0
20
40
60
80
100