In [72]:
```
import warnings
warnings.filterwarnings('ignore')

import numpy as np
import pandas as pd

from statsmodels.tsa.arima_process import ArmaProcess
import matplotlib.pyplot as plt
import numpy as np
from statsmodels.graphics.tsaplots import plot_acf
import datetime
```

In [ ]:
```
```

In [73]:
```
passenger = pd.read_csv('airline-passengers.csv')
passenger.head()
```

Out[73]:

	Month	Passengers
0	1949-01	112
1	1949-02	118
2	1949-03	132
3	1949-04	129
4	1949-05	121

In [74]:
```
print(passenger.info())
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 144 entries, 0 to 143
Data columns (total 2 columns):
 #   Column      Non-Null Count  Dtype 
---  ------      --------------  ----- 
 0   Month       144 non-null    object
 1   Passengers  144 non-null    int64 
dtypes: int64(1), object(1)
memory usage: 2.4+ KB
None
```

In [75]:
```
passenger.Month=passenger.Month.apply(lambda x:datetime.datetime.strpt
ime(x,'%Y-%m'))
```

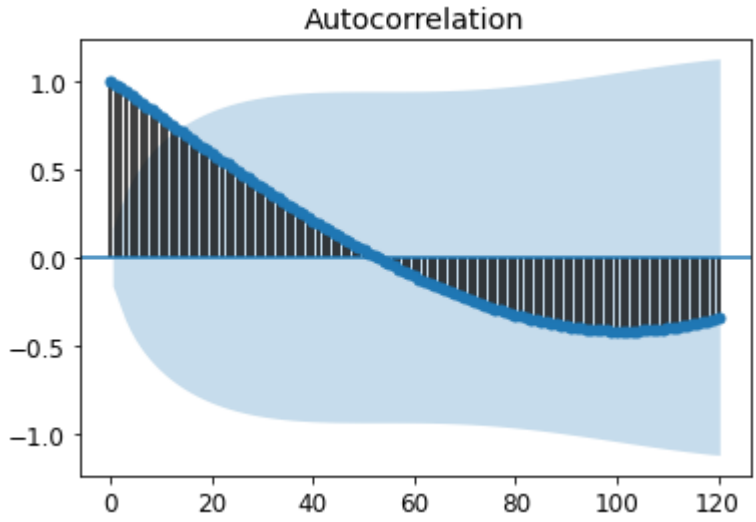
In [76]:
```
plt.rc('font', size=12)
fig, ax = plt.subplots(figsize=(20, 6))

# Specify how our lines should look
ax.plot(passenger.Month, passenger.Passengers, color='tab:orange', lab
el='monthly observations')



ax.set_xlabel('Months')
ax.set_ylabel('Passengers in thousands')
ax.set_title('total number of airline passengers over time')
ax.grid(True)
ax.legend(loc='upper left');
```

In [68]:
```
plot_acf(passenger.Month ,lags=120)
plt.show()
```



a) (a) Draw the time series plot and ACF plot. Explain why the general trend of the sample autocorrelation in ACF plot is decreasing to negative and then increase to around 0 when lag h is increasing, and why there are "jumps" around lags h = 12,24,36,... based on the time series plot.

ANS--> The plot is explaining the Trend plus seasonality in the plot above about the total number of airline passengers over time. The Autocorrelation plot

In [ ]: