

## h22

October 5, 2020

```
[208]: %matplotlib inline
import numpy as np
import matplotlib as mpl
import matplotlib.pyplot as plt

fig_width_pt = 3*246.0 # Get this from LaTeX using \showthe\columnwidth
inches_per_pt = 1.0/72.27 # Convert pt to inch
golden_mean = (np.sqrt(5)-1.0)/2.0 # Aesthetic ratio
fig_width = fig_width_pt*inches_per_pt # width in inches
fig_height = fig_width*golden_mean # height in inches
fig_size = [fig_width,fig_height]

params = { 'axes.labelsize': 24,
           'font.family': 'serif',
           'font.serif': 'Computer Modern Raman',
           'font.size': 24,
           'legend.fontsize': 20,
           'xtick.labelsize': 24,
           'ytick.labelsize': 24,
           'axes.grid' : True,
           'text.usetex': True,
           'savefig.dpi' : 100,
           'lines.markersize' : 14,
           'figure.figsize': fig_size}

mpl.rcParams.update(params)
```

```
[209]: import lal
import lalsimulation as lalsim
import numpy as np
```

```
[210]: #approx=lalsim.SEOBNRv4
m1 = 30
m2 = 30
s1 = [0,0,0]#[0.4,-0.2,0.43]
s2 = [0,0,0]#[-0.1,0.8,0]
dist = 400.
iota = 0
```

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phi_c = 0.

deltaT = 1./4096
f_ref = 20.
f_low = 20

longAscNodes = 0
eccentricity = 0
meanPerAno = 0
nonGRdict = lal.CreateDict()

```

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[211]: data = np.loadtxt("./h22.txt")
nqc = lal.CreateREAL8Vector(10)

for version in [4]:
    nqc = lal.CreateREAL8Vector(10)
    hlm,dylow,dyhigh = lalsim.SimIMRSpinAlignedEOBModes(deltaT,\
        m1 * lal.MSUN_SI, m2 * lal.MSUN_SI,\
        f_low, dist * 1e6 * lal.PC_SI,\
        s1[2],s2[2],\
        int(version),\
        0,0,0,0,0,0,0,0,\
        0,0,\
        nqc,0)

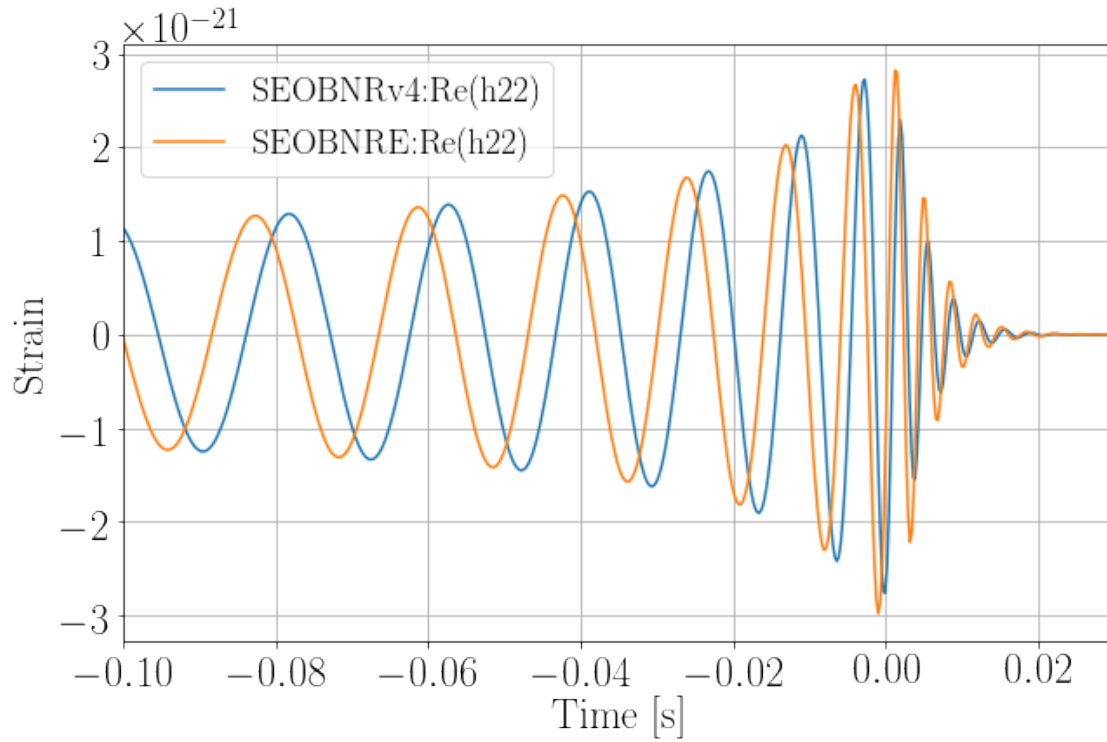
    t1 = np.arange(hlm.mode.data.length, dtype=float) * hlm.mode.deltaT
    t1 = t1 + hlm.mode.epoch
    plt.plot(t1, np.real(hlm.mode.data.data), label='SEOBNRv'+str(version)+' :
    →Re(h22) ')
plt.plot(data[:,0],data[:,1],label='SEOBNRE:Re(h22) ')
plt.legend()
plt.xlim(-0.1,0.03)
plt.xlabel('Time [s]')
plt.ylabel('Strain')

```

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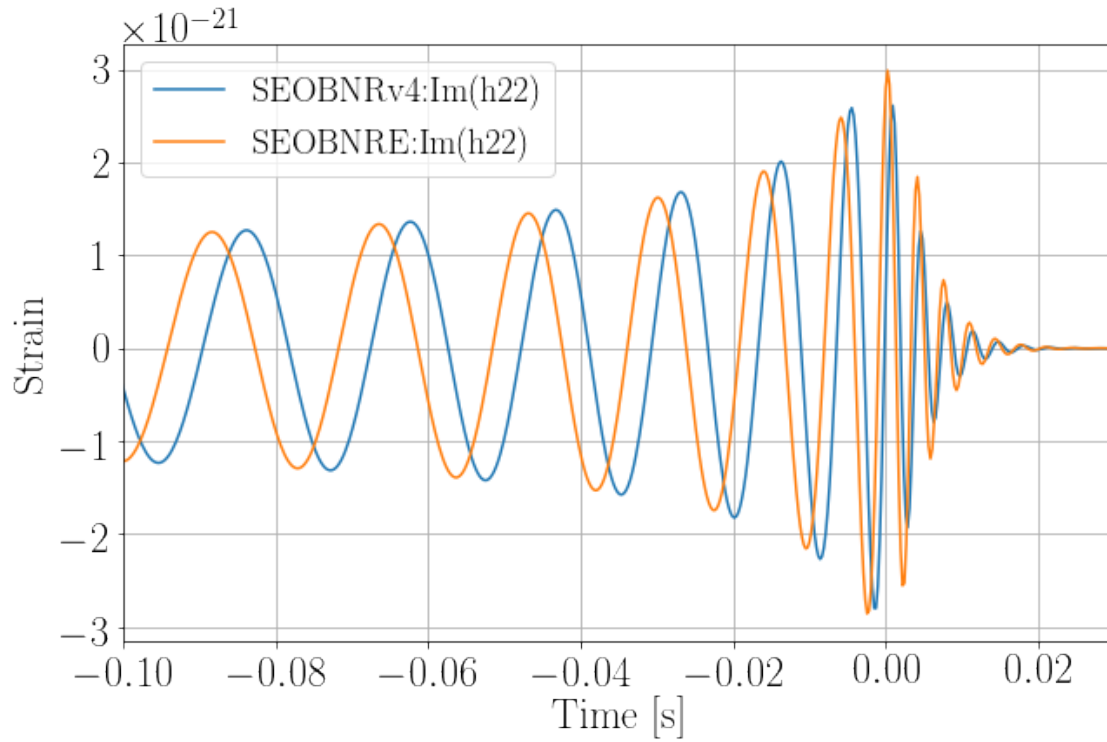
[211]: Text(0, 0.5, 'Strain')

```



```
[212]: plt.plot(t1, np.imag(hlm.mode.data.data), label='SEOBNRv'+str(version)+' :
        →Im(h22) ')
plt.plot(data[:,0],data[:,2],label='SEOBNRE: Im(h22) ')
plt.legend()
plt.xlim(-0.1,0.03)
plt.xlabel('Time [s]')
plt.ylabel('Strain')
```

```
[212]: Text(0, 0.5, 'Strain')
```



```
[213]: plt.plot(t1, np.abs(hlm.mode.data.data), label='SEOBNRv'+str(version)+'  

→$|h_{22}|$')  

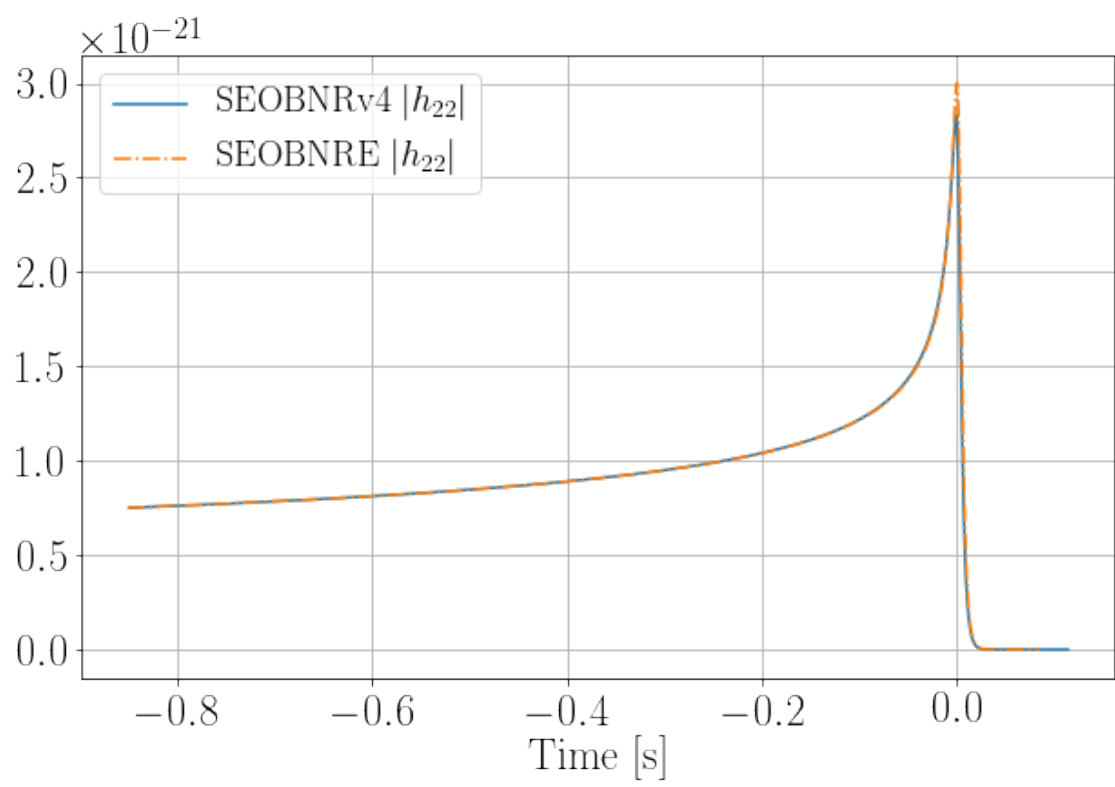
plt.plot(data[:,0],np.sqrt(data[:,1]**2+data[:,2]**2),ls='-.',label='SEOBRE_  

→$|h_{22}|$')  

plt.legend()  

plt.xlabel('Time [s]')
```

```
[213]: Text(0.5, 0, 'Time [s]')
```



[1]: