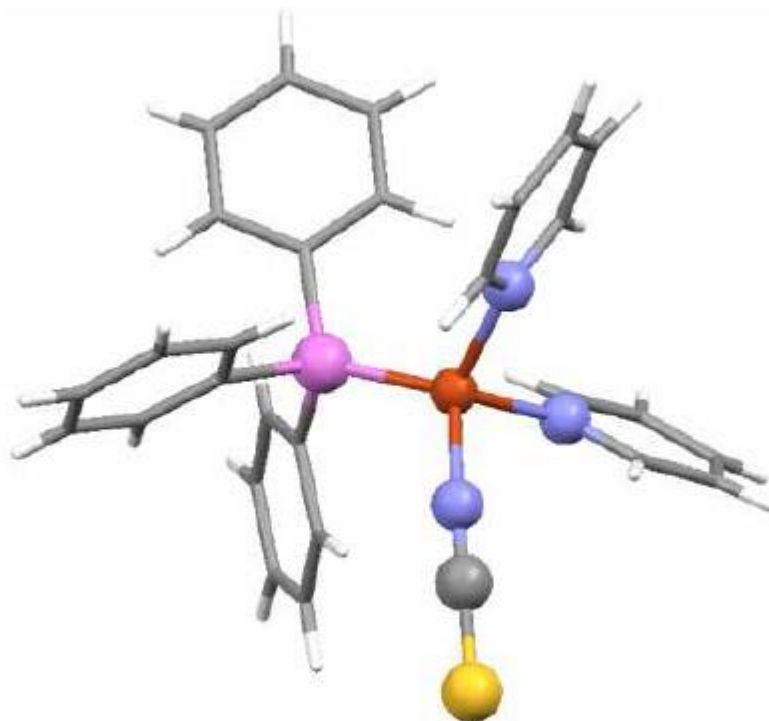


## ESPERIENZA 3

### Struttura allo stato solido



**Cu(I),  $d^{10}$ , Geometria tetraedrica  
diamagnetico**

#### Distanze di legame (Å)

**Cu-NCS 2.013(2)**

**Cu-P(1) 2.1974(5)**

**Cu-N(1) 2.091(2)**

**Cu-N(2) 2.070(1)**

**S-C 1.638(2)**

**C-N 1.168(3)**

#### Angoli di legame (°)

**SCN-Cu-N 99.58(8)**

**106.70(6)**

**SCN-Cu-P 115.34(6)**

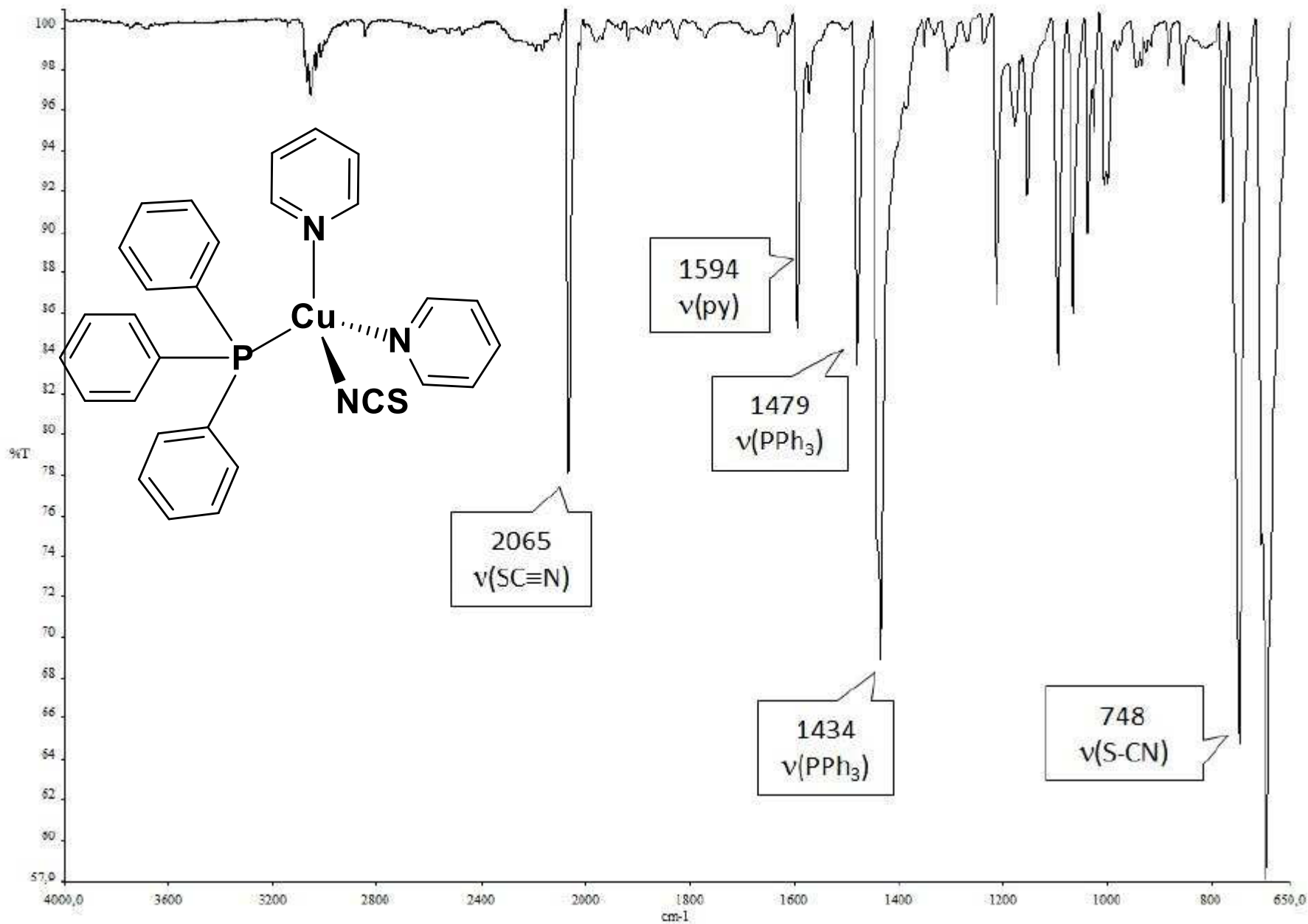
**P-Cu-N 116.27(4)**

**116.27(4)**

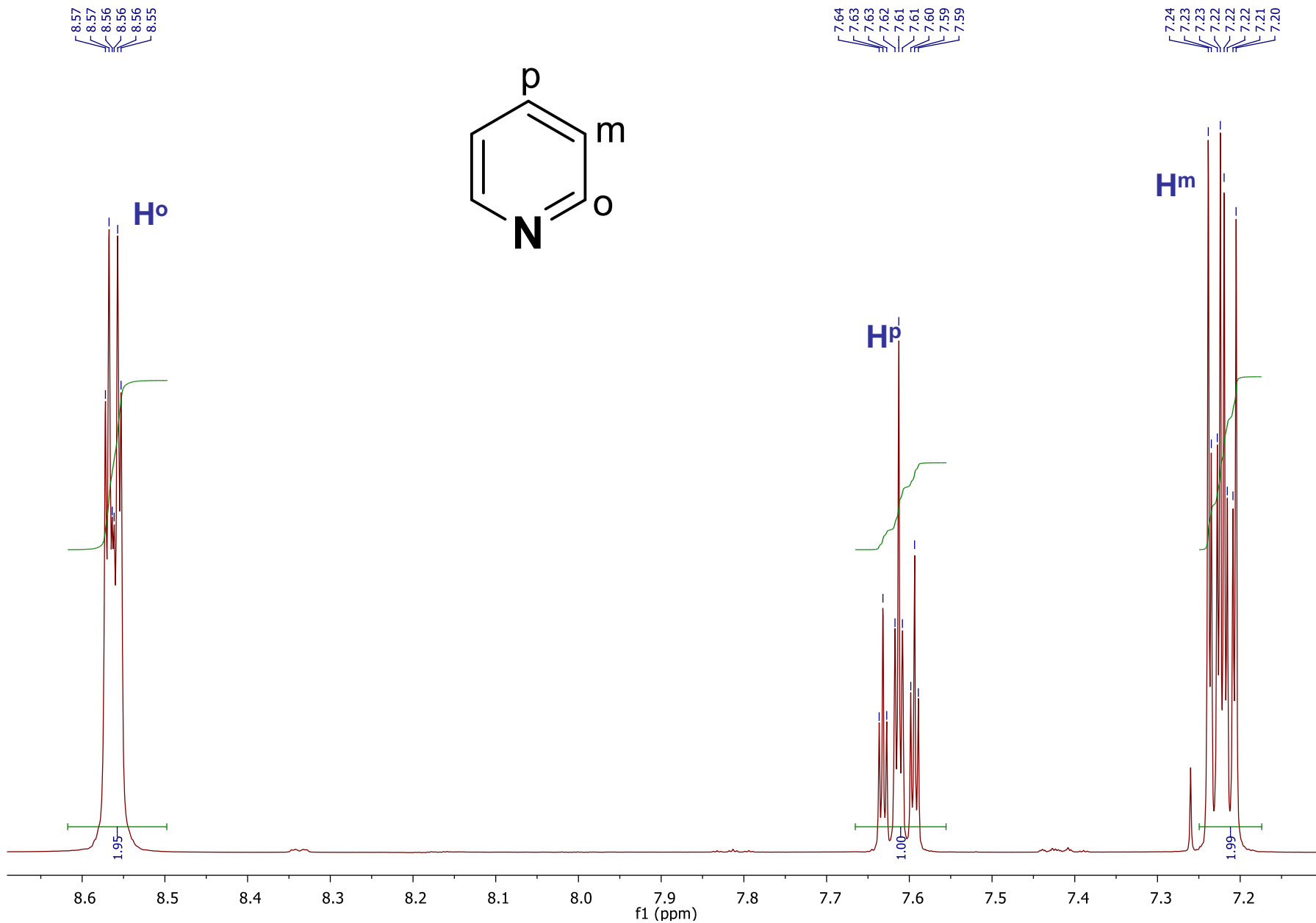
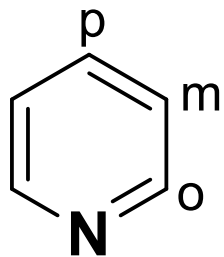
**Cu-N-C 157.4(2)**

**N-C-S 179.5(2)**

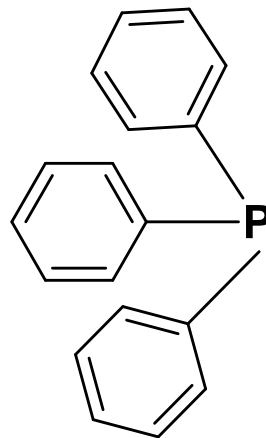
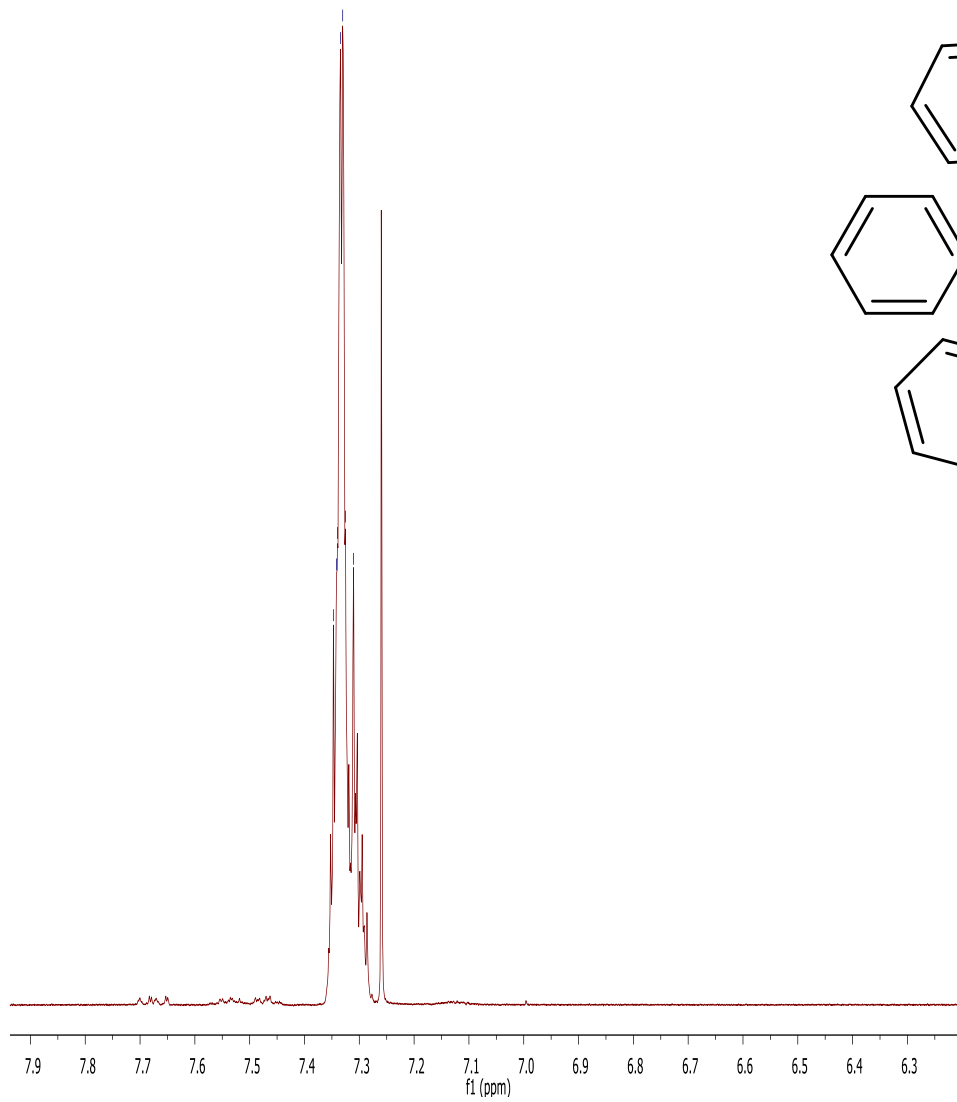
# Spettro IR di



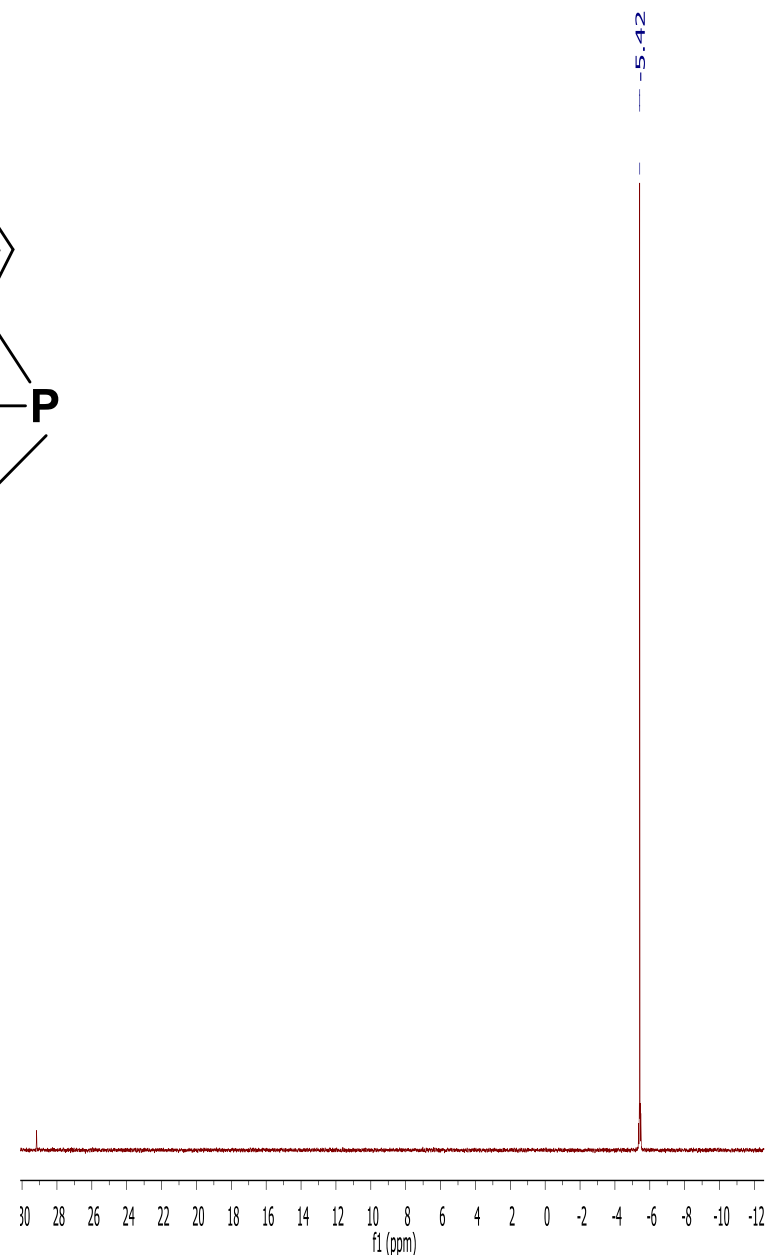
# Spettri $^1\text{H}$ NMR in $\text{CDCl}_3$ , a t.a. di



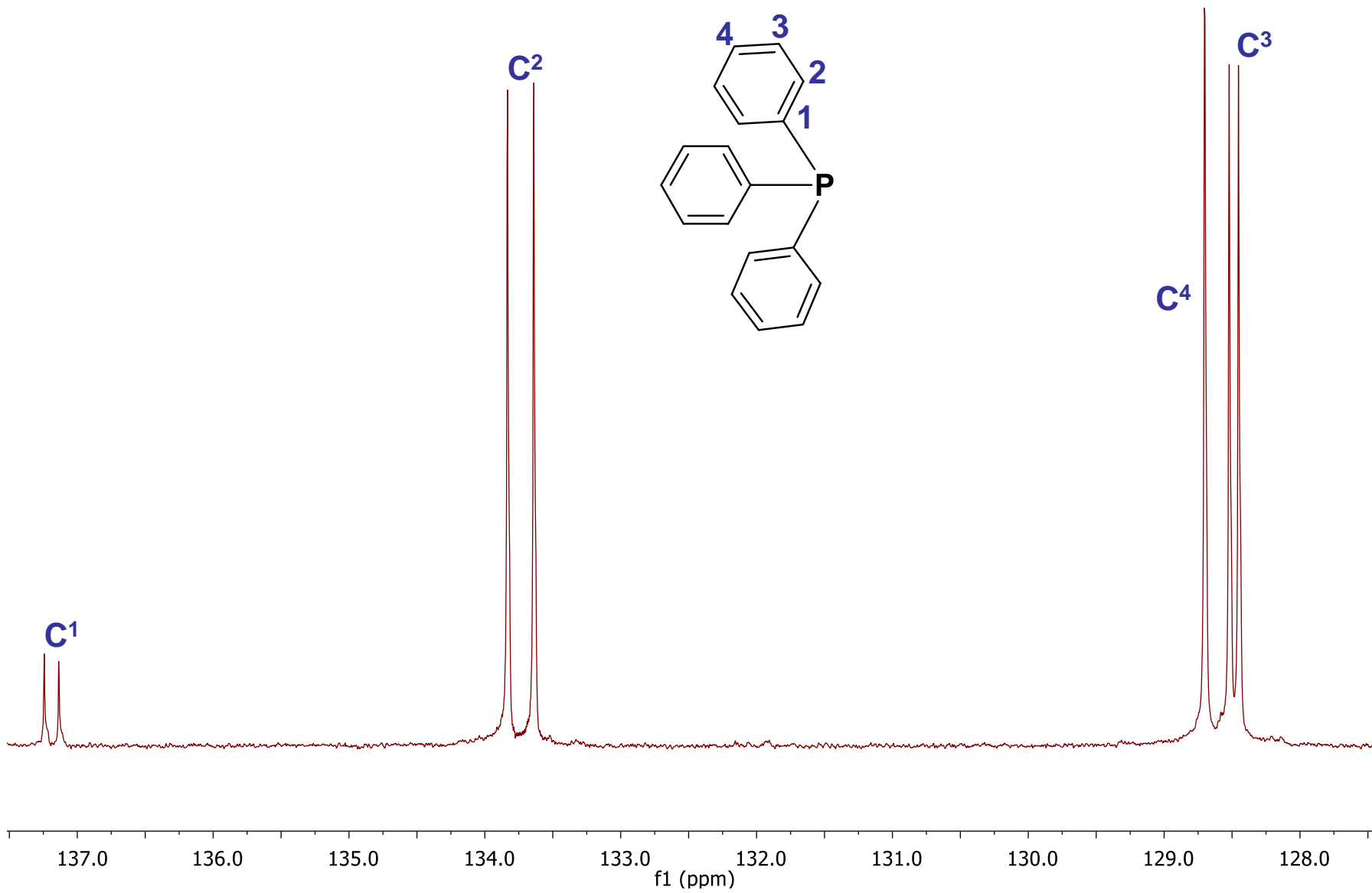
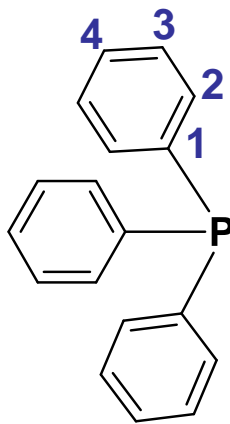
# Spettri $^1\text{H}$ NMR in $\text{CDCl}_3$ , a t.a. di



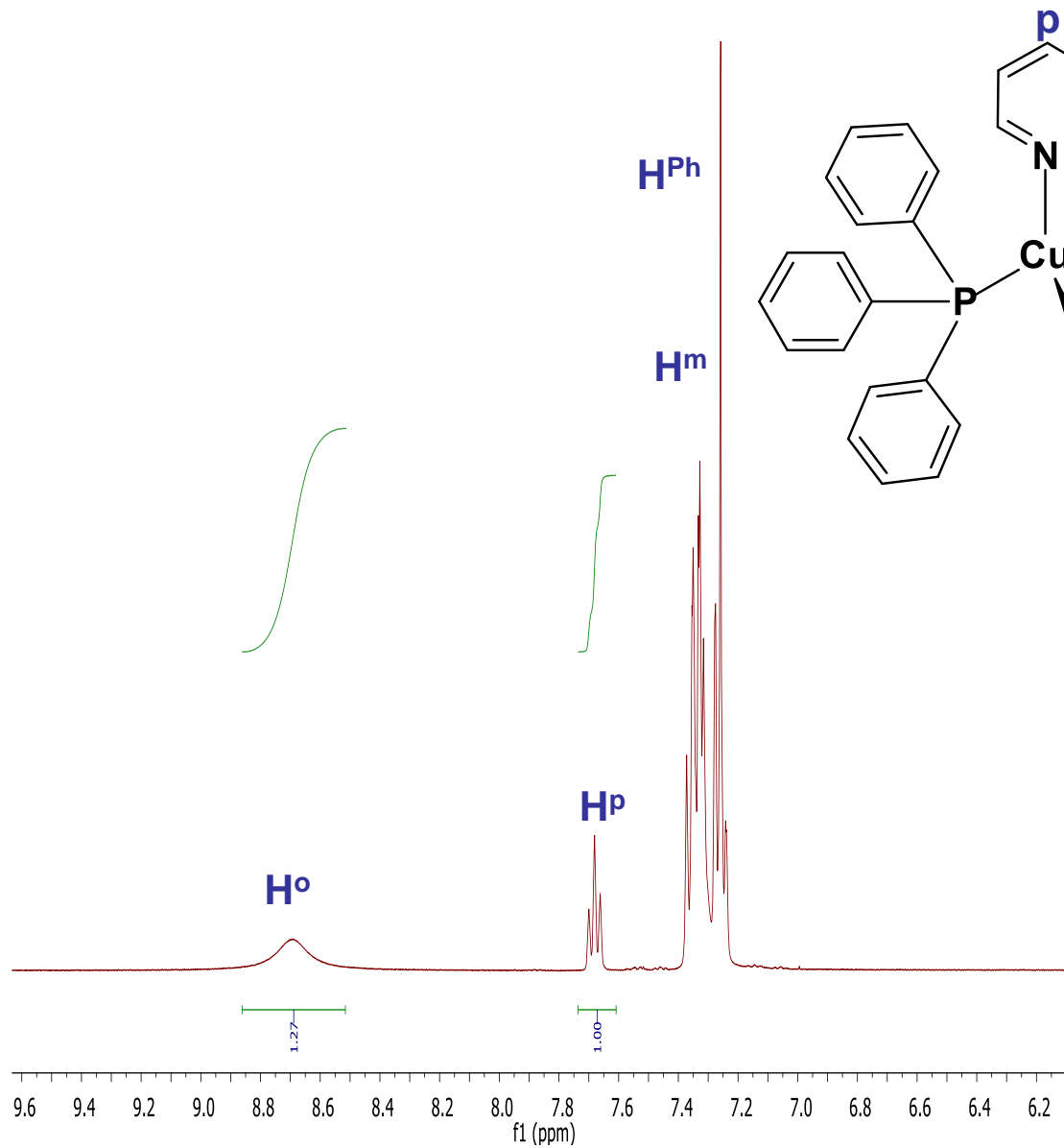
# Spettro $^{31}\text{P}$ NMR



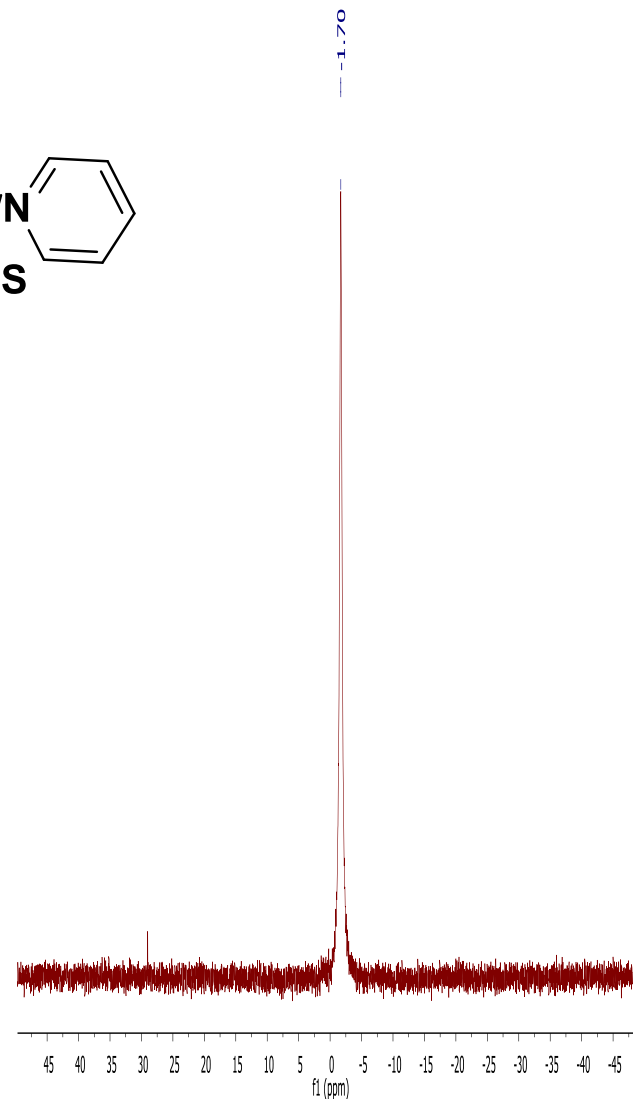
# Spettri $^{13}\text{C}$ NMR in $\text{CDCl}_3$ , a t.a. di



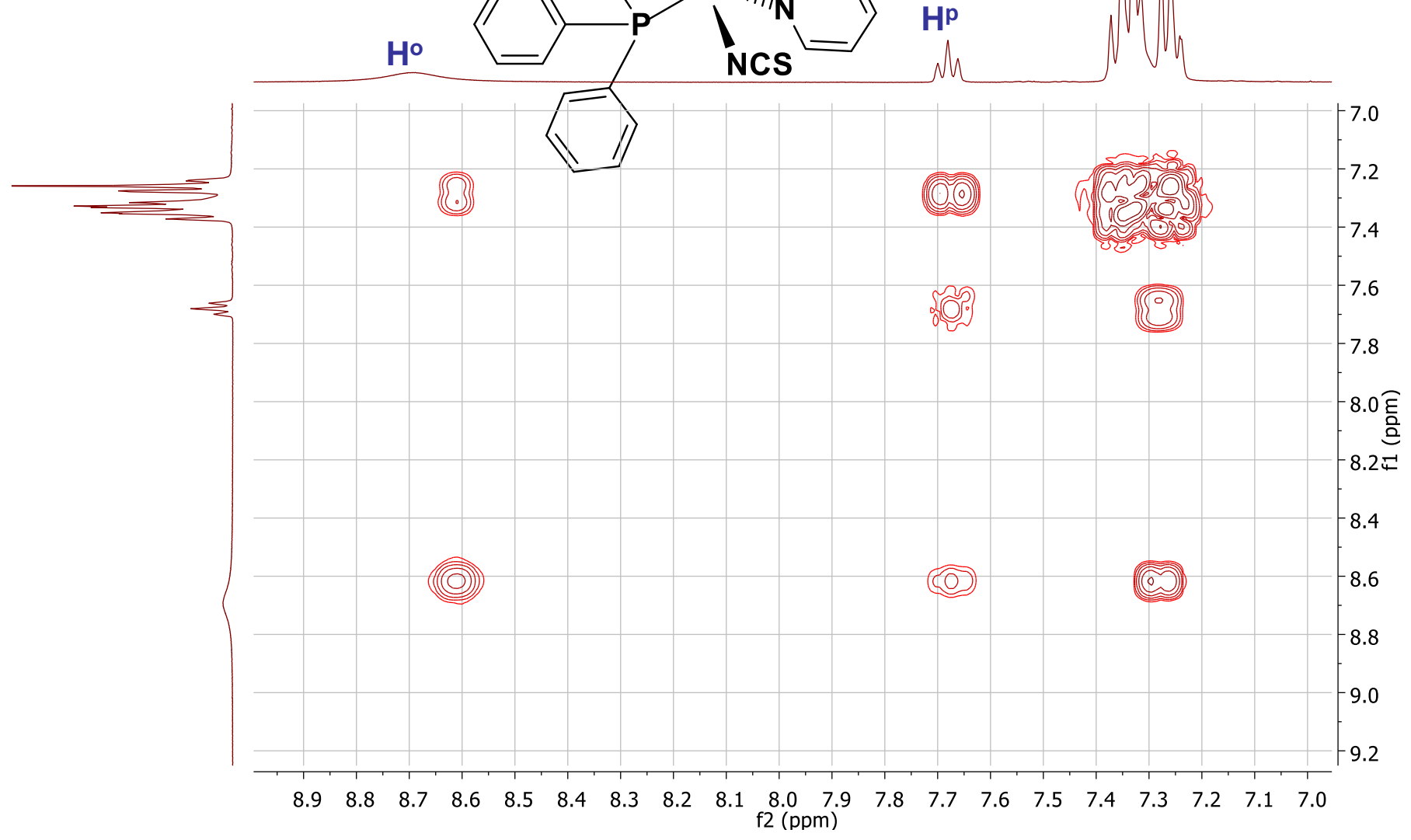
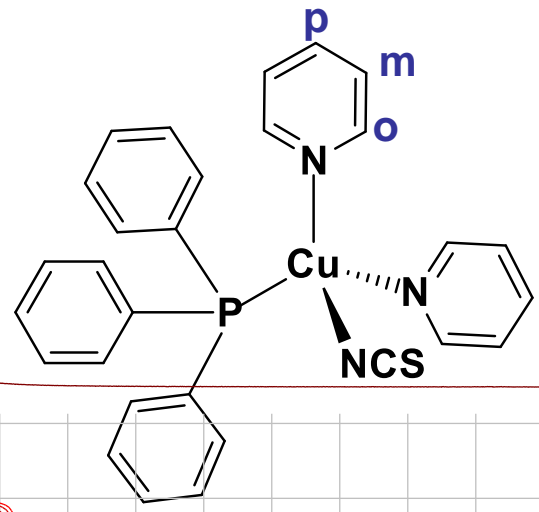
# Spettri $^1\text{H}$ NMR in $\text{CDCl}_3$ , a t.a. di



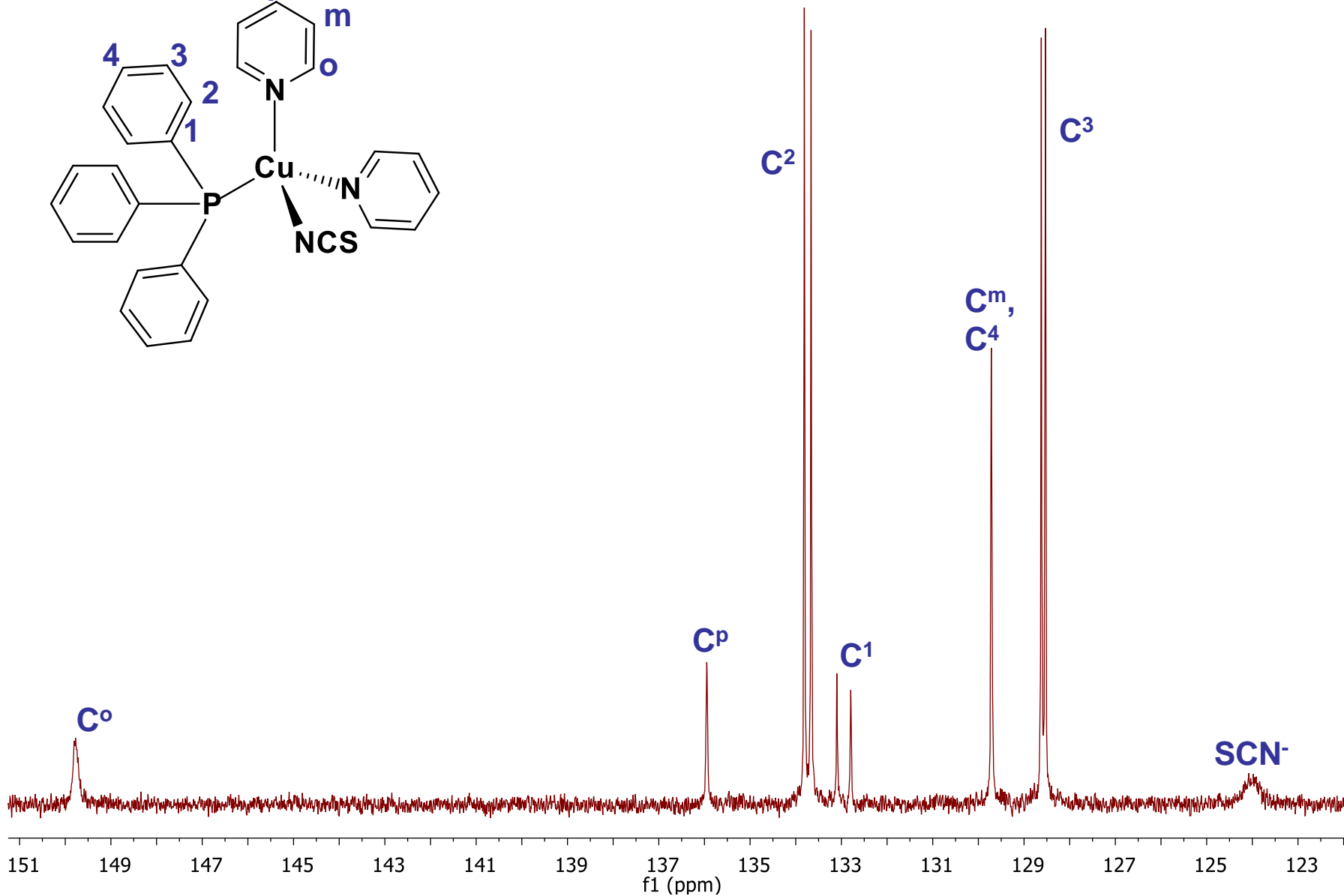
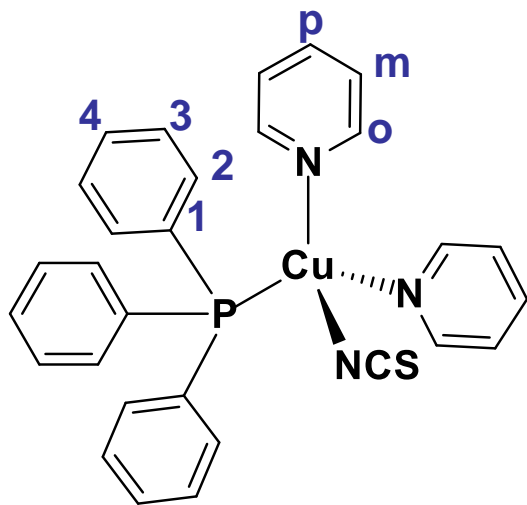
# Spettro $^{31}\text{P}$ NMR



Spettro  $^1\text{H}, ^1\text{H}$  COSY in  $\text{CDCl}_3$ , a t.a. di

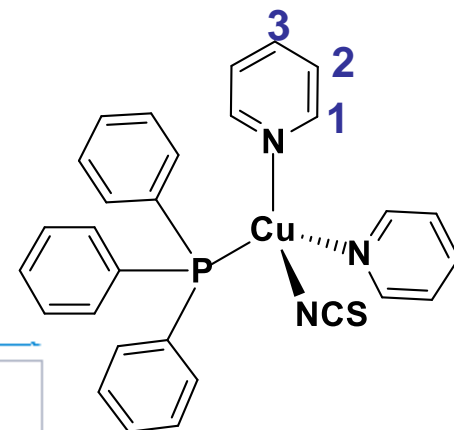
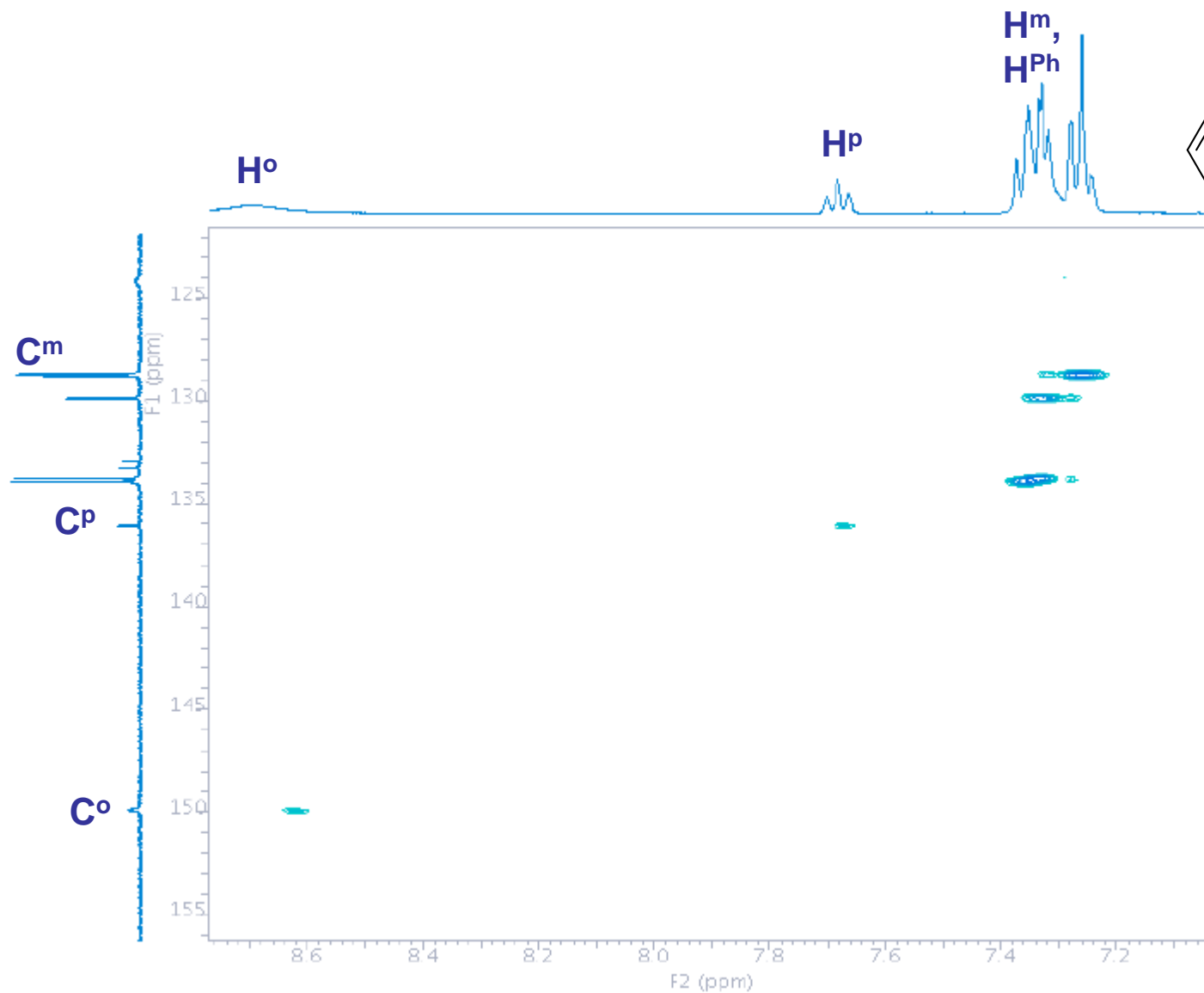


# Spettri $^{13}\text{C}$ NMR in $\text{CDCl}_3$ , a t.a. di

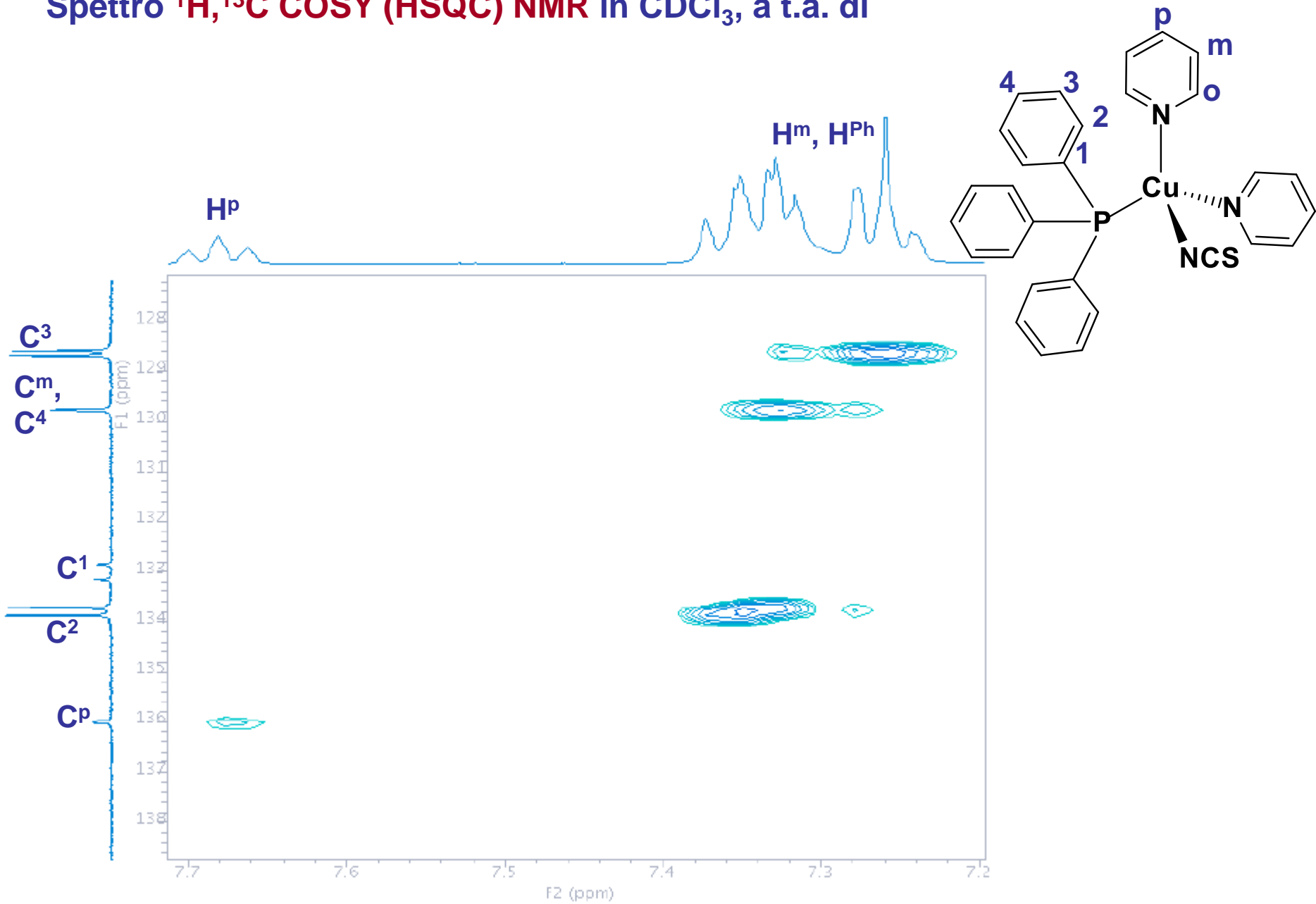




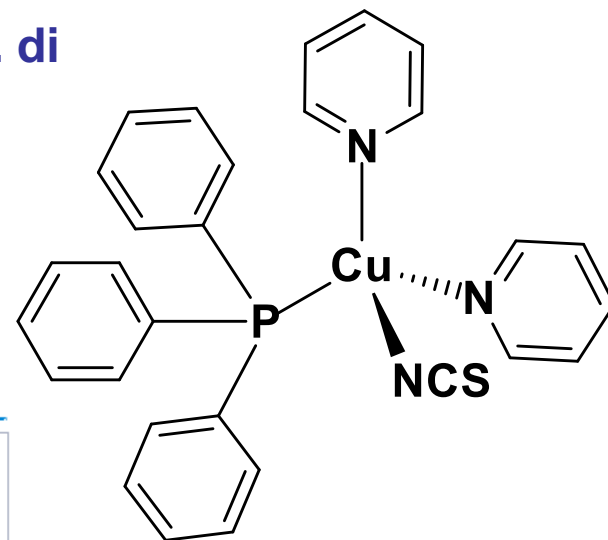
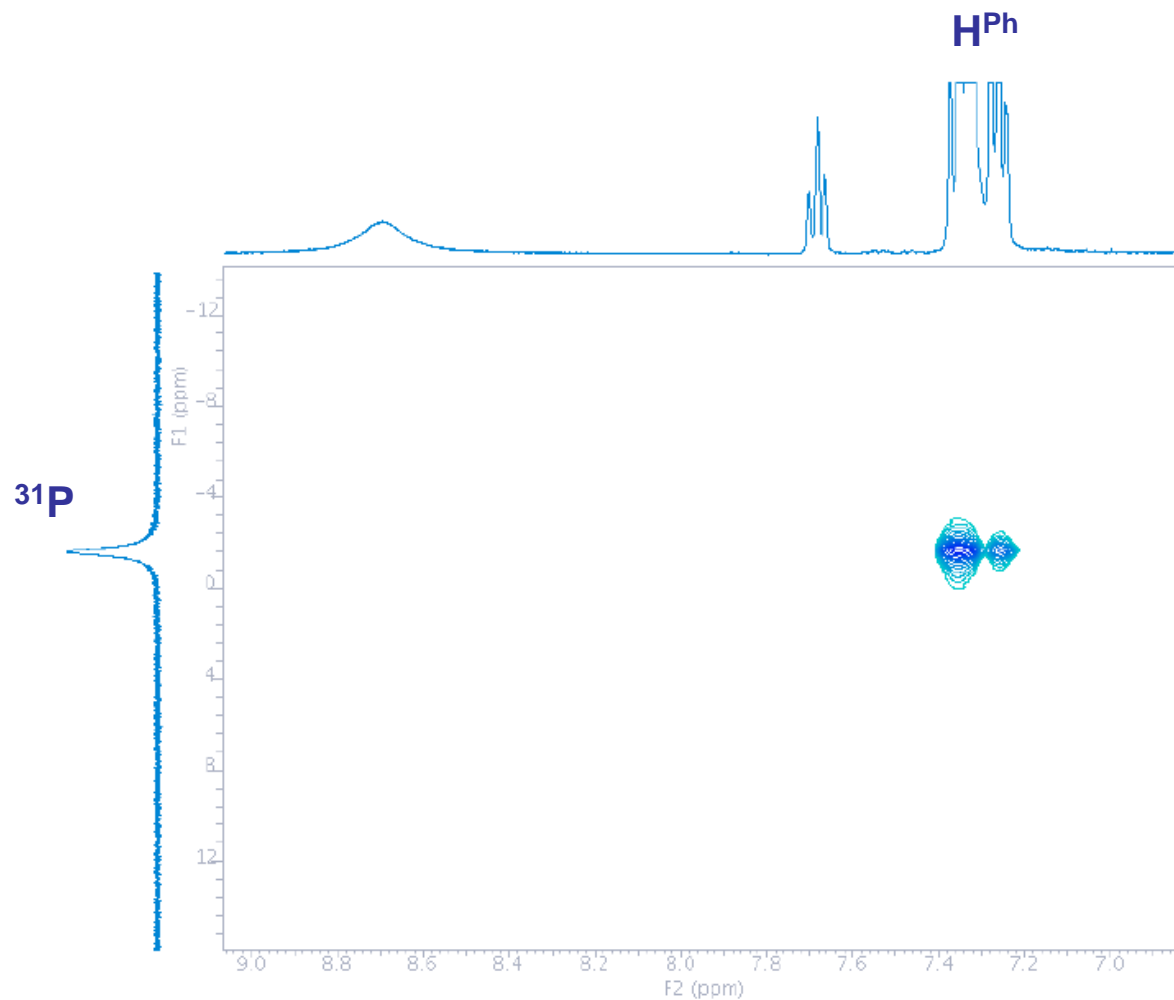
# Spettro $^1\text{H},^{13}\text{C}$ COSY (HSQC) NMR in $\text{CDCl}_3$ , a t.a. di



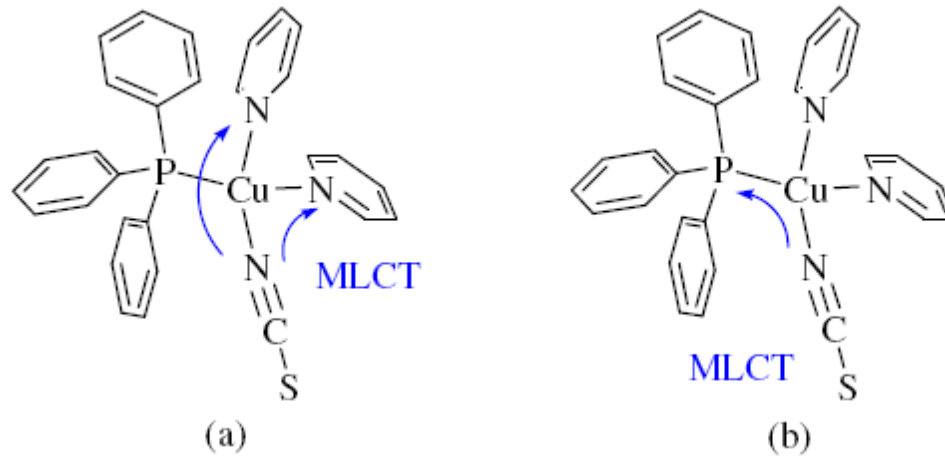
# Spettro $^1\text{H},^{13}\text{C}$ COSY (HSQC) NMR in $\text{CDCl}_3$ , a t.a. di



# Spettro $^1\text{H},^{31}\text{P}$ COSY (HMBC) NMR in $\text{CDCl}_3$ , a t.a. di



## La **fotoluminescenza**



## La **triboluminescenza**

**Ipotesi** sulla natura della triboluminescenza:

La frammentazione del cristallo dovrebbe comportare la rottura dei legami Cu-NCS, in modo tale che un numero sufficiente di elettroni di legame (o di ioni negativi  $\text{NCS}^-$ ) rimane sulla superficie della frattura. Allo stesso tempo dei frammenti carichi positivamente si formano sull'altra superficie.

La ricombinazione delle cariche comporta una scarica elettrica che è responsabile della luce emessa.