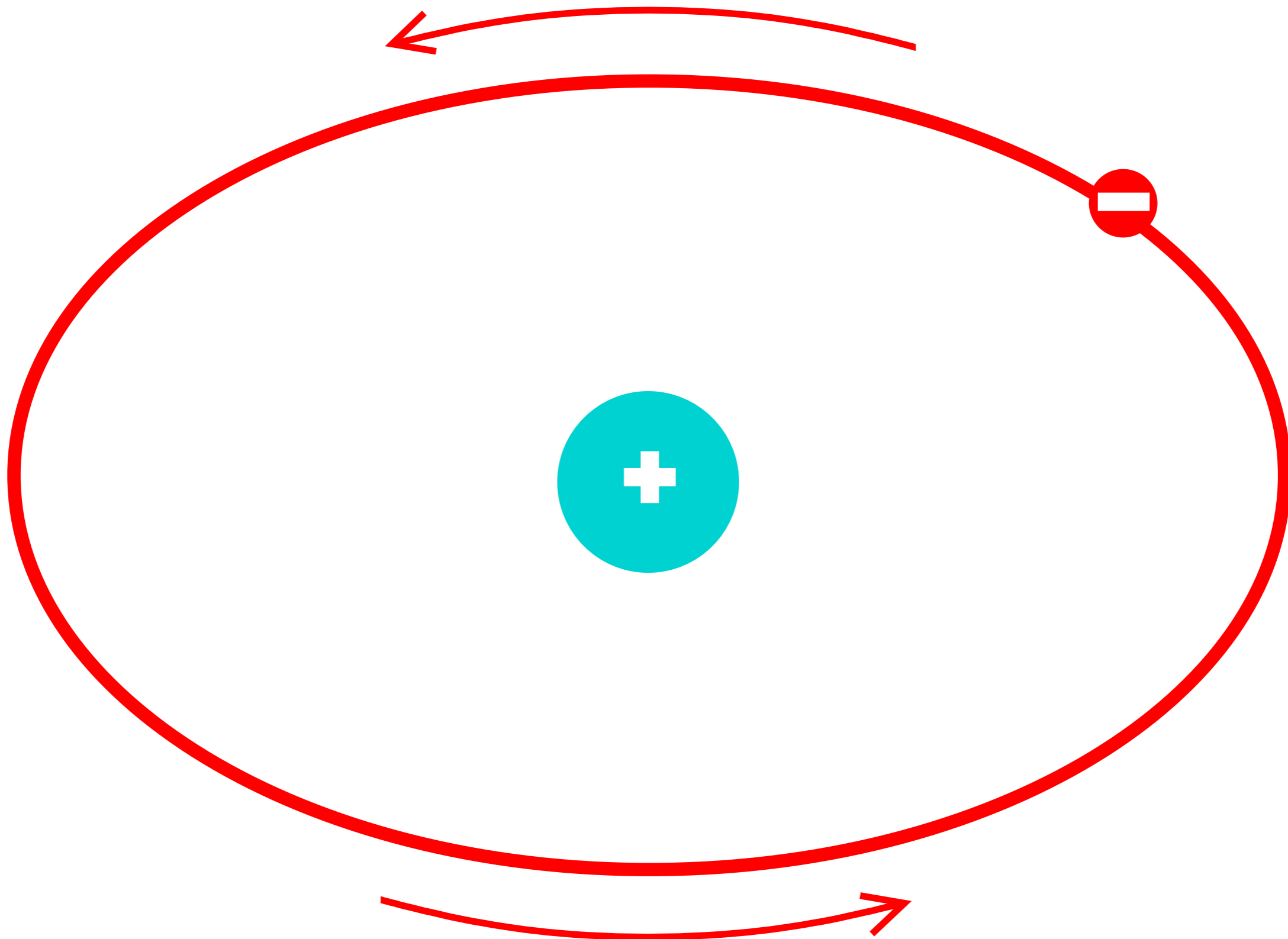
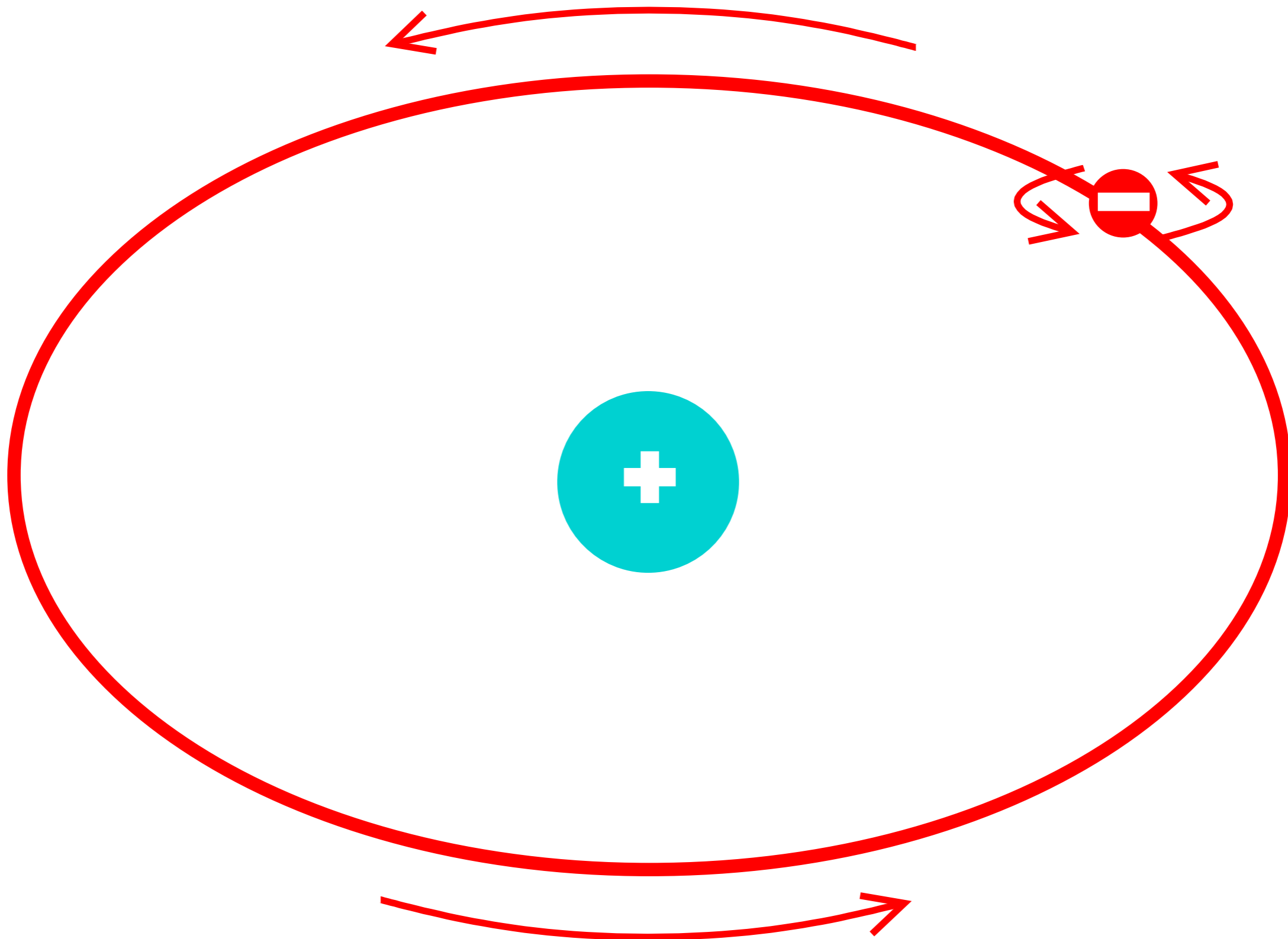
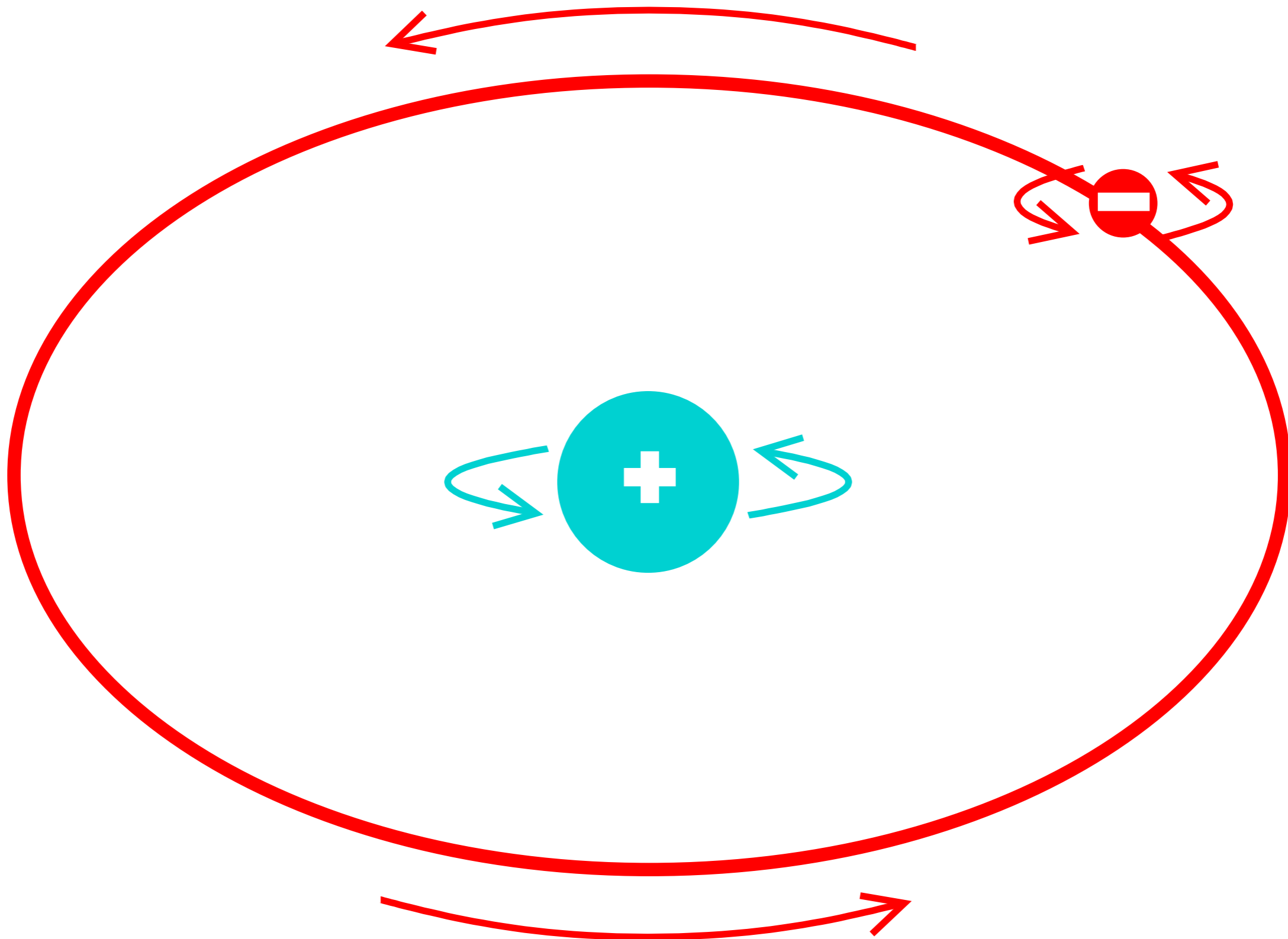
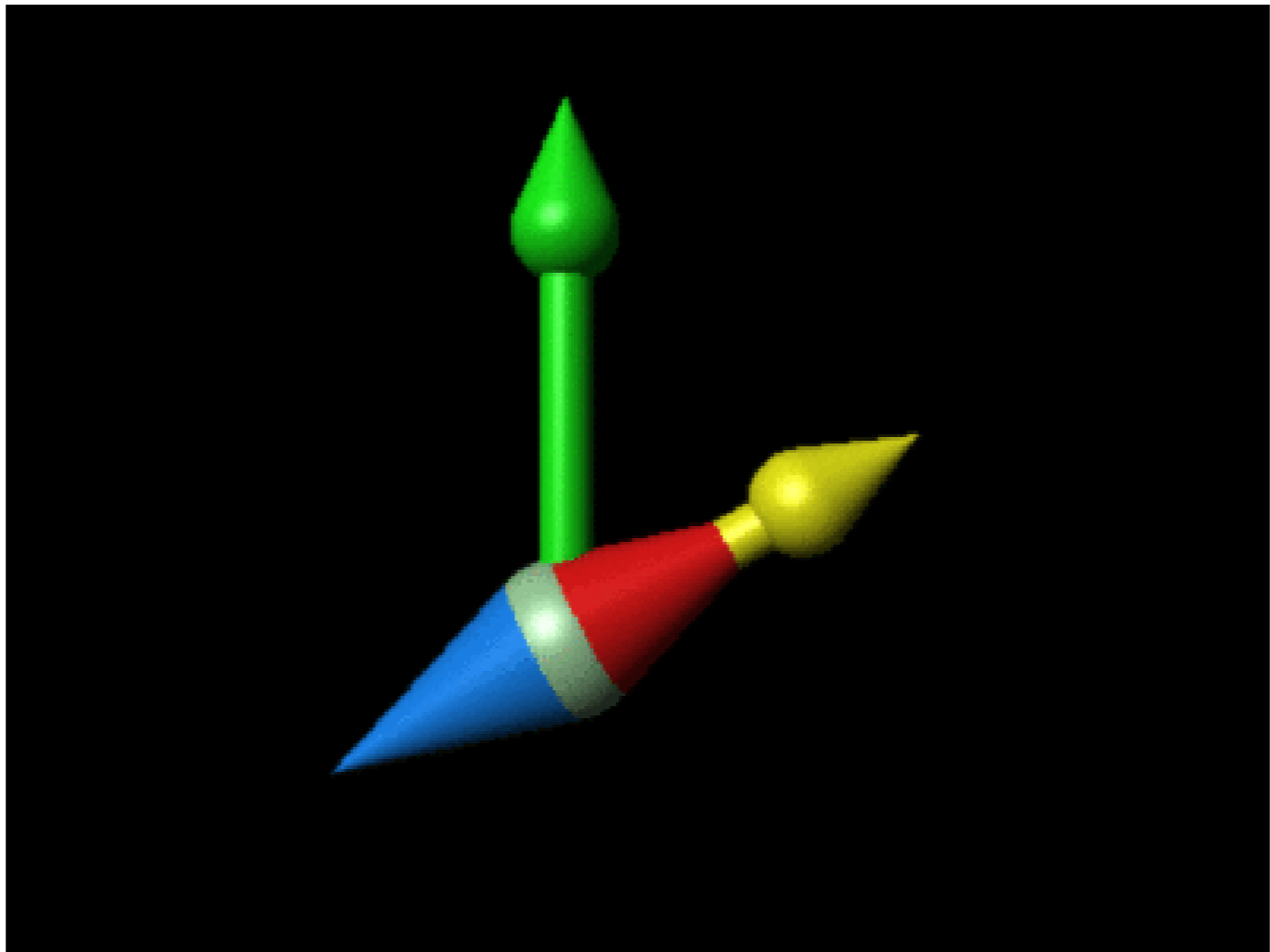


# NUKLEÁRNÍ MAGNETICKÁ REZONANCE

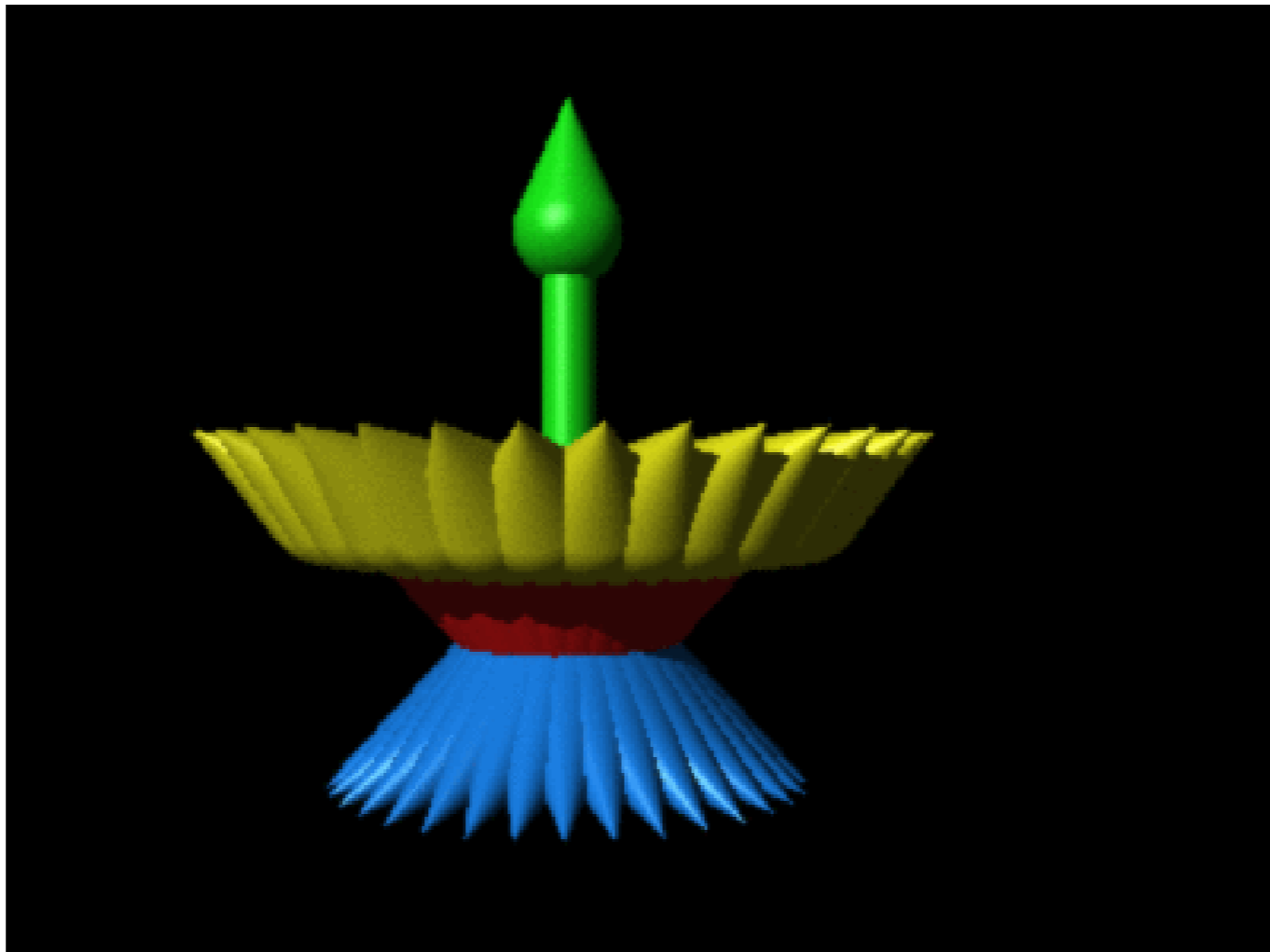


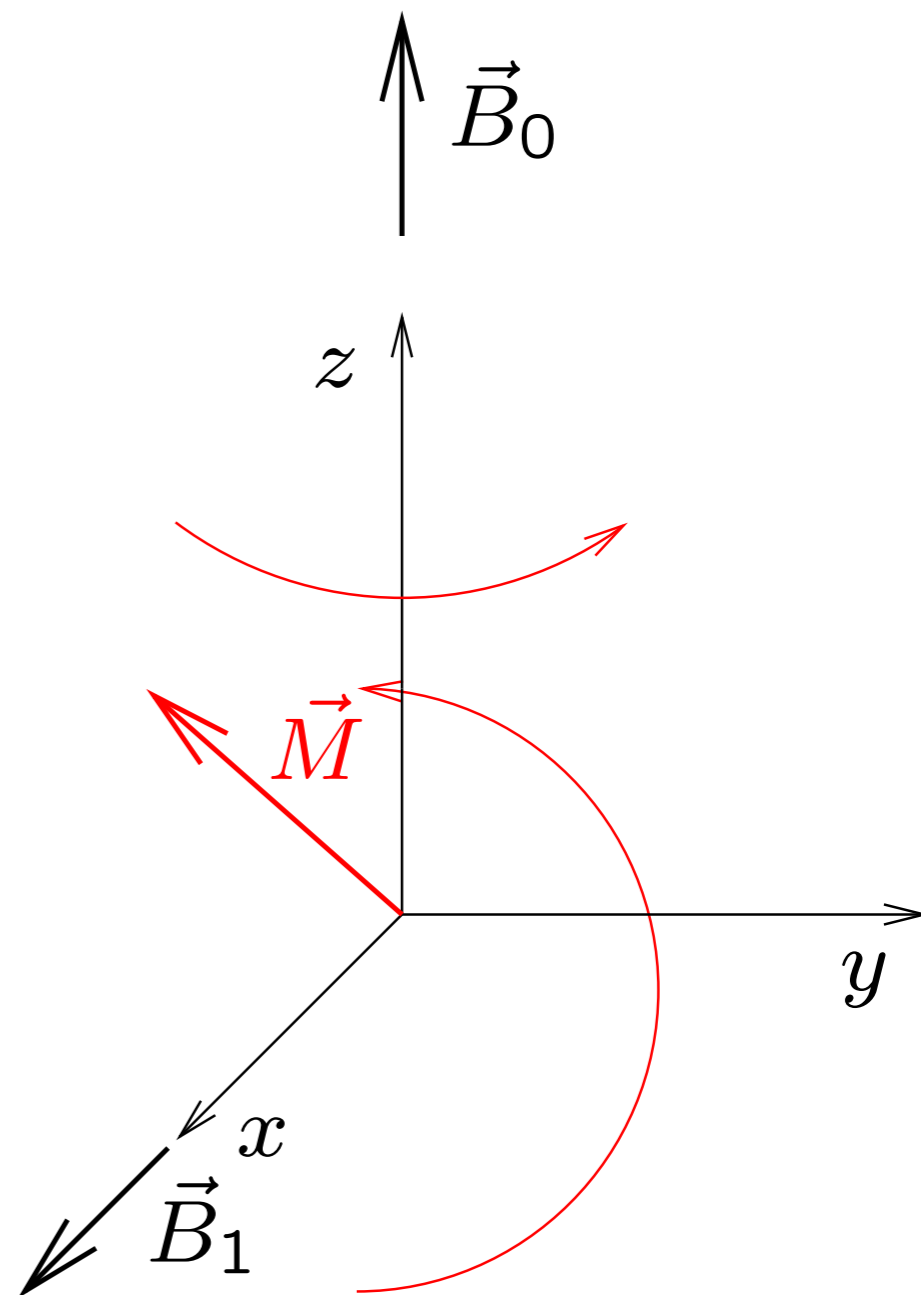
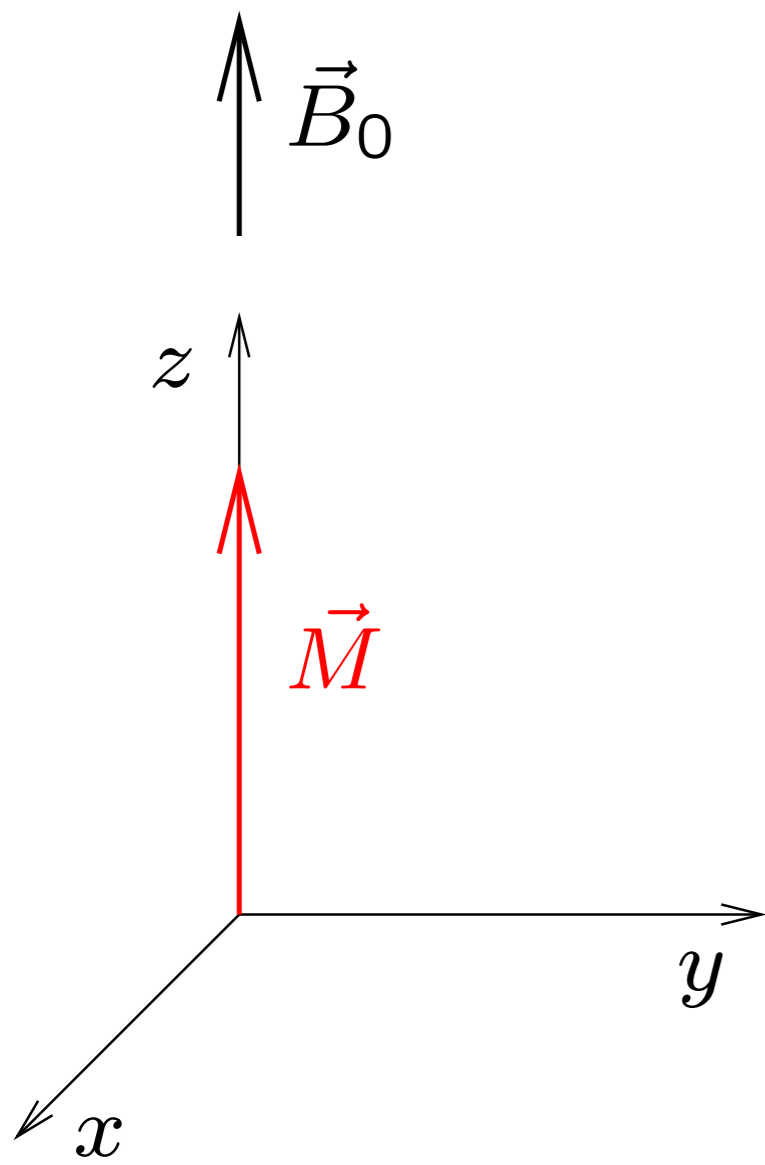






Jedno jádro v magnetickém poli





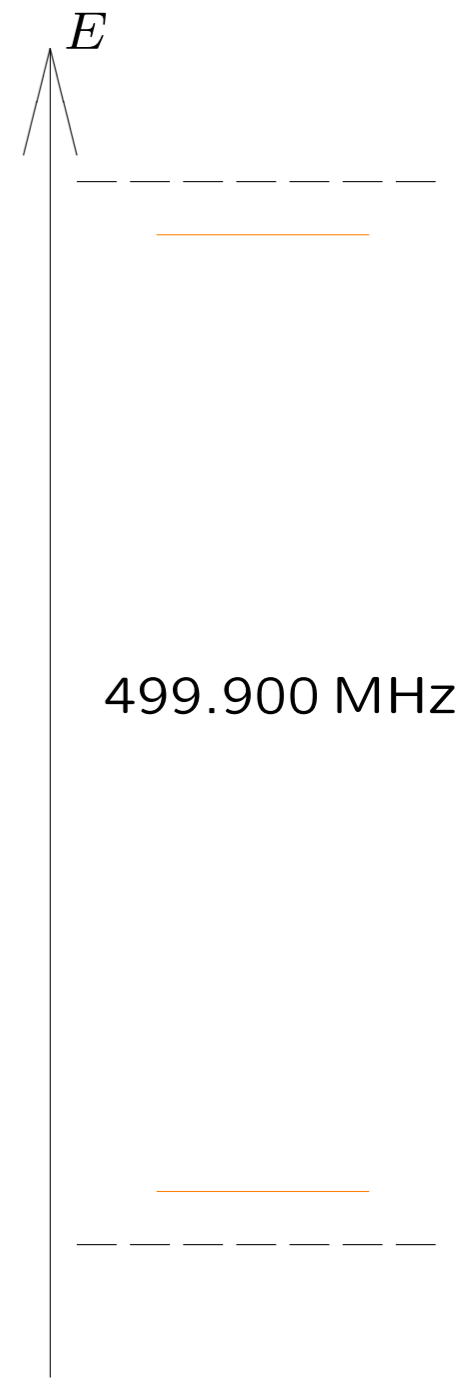
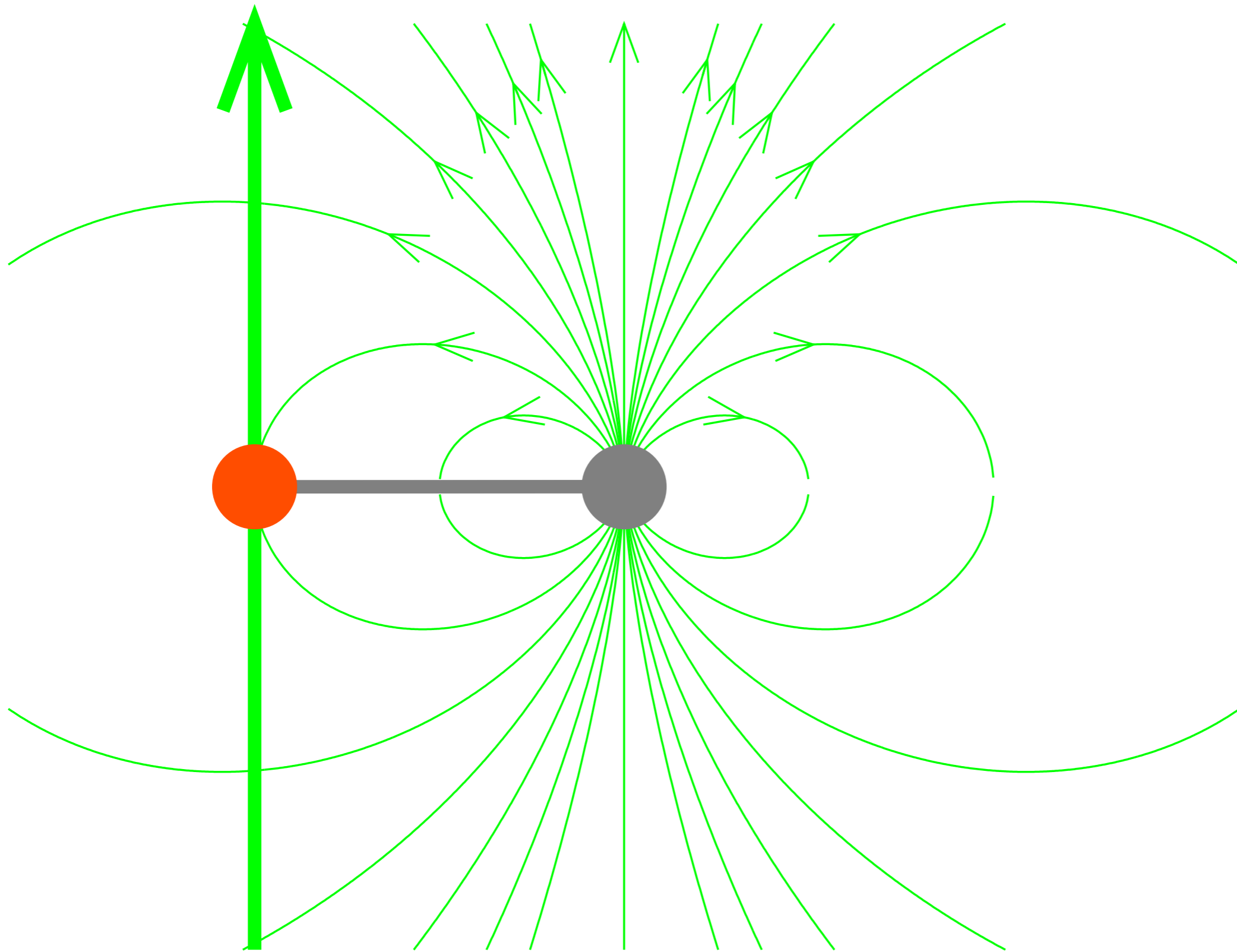


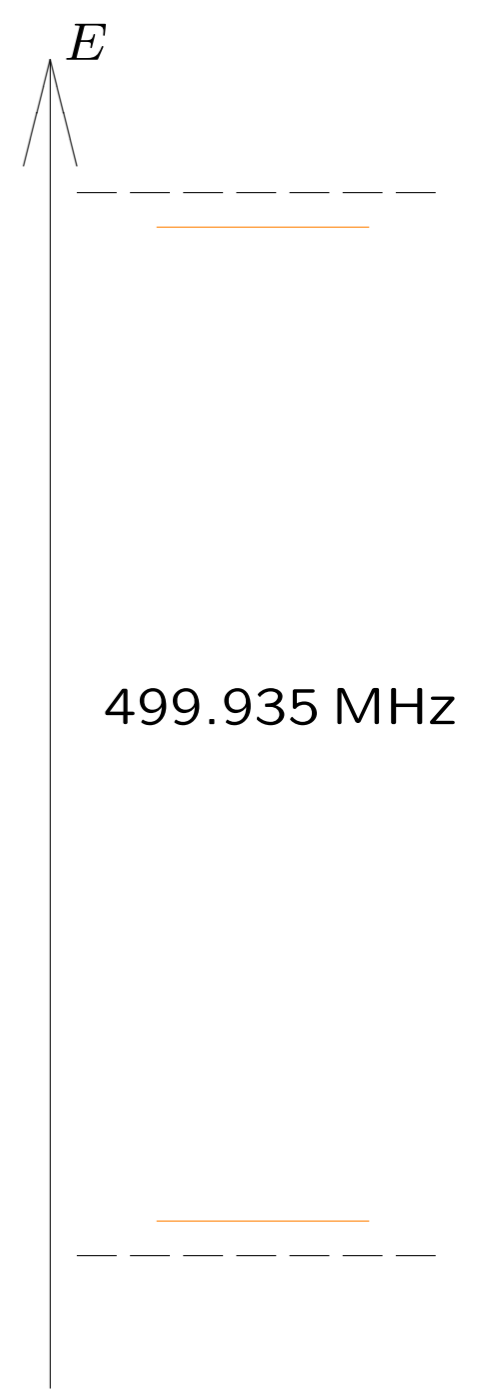
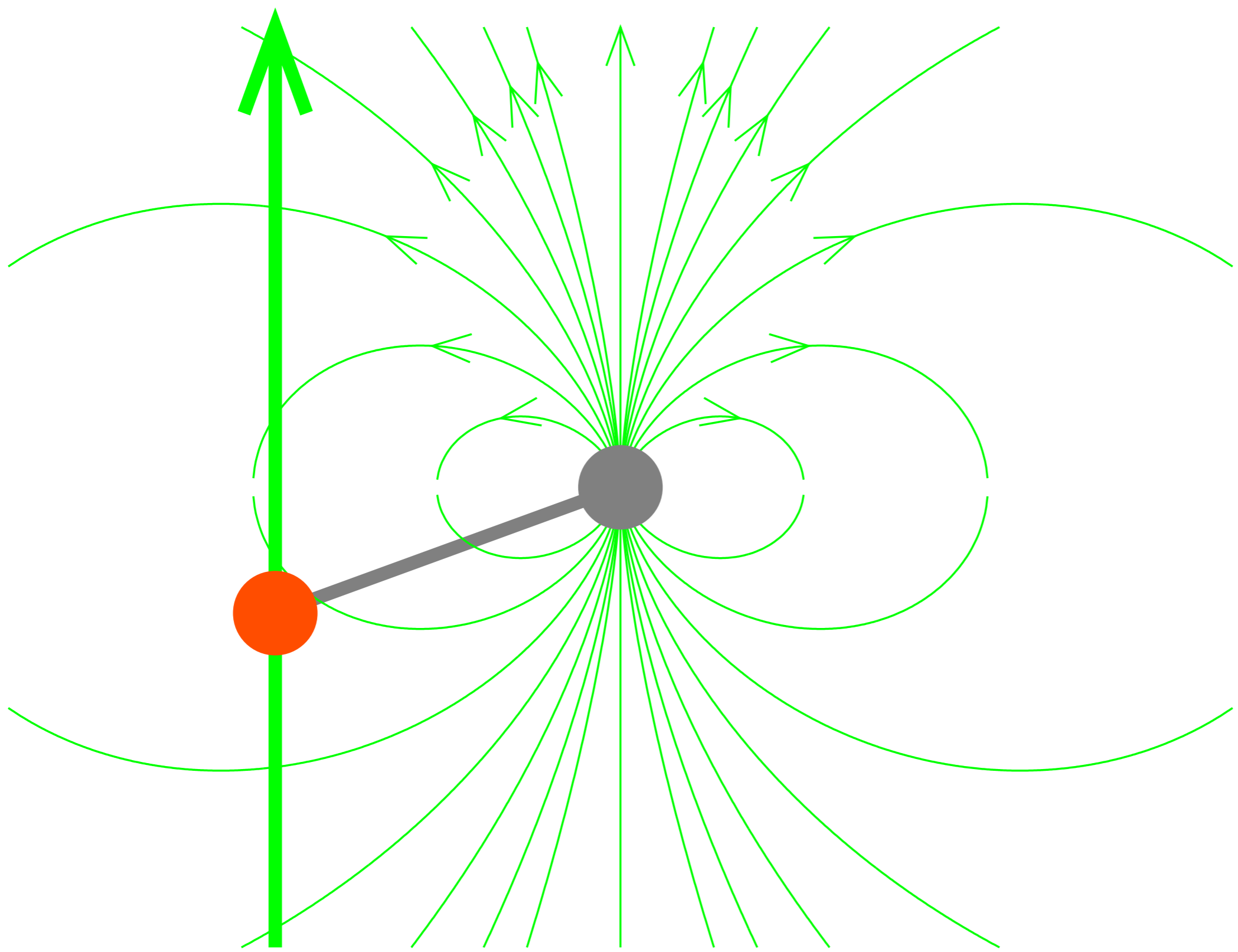
# Experiment

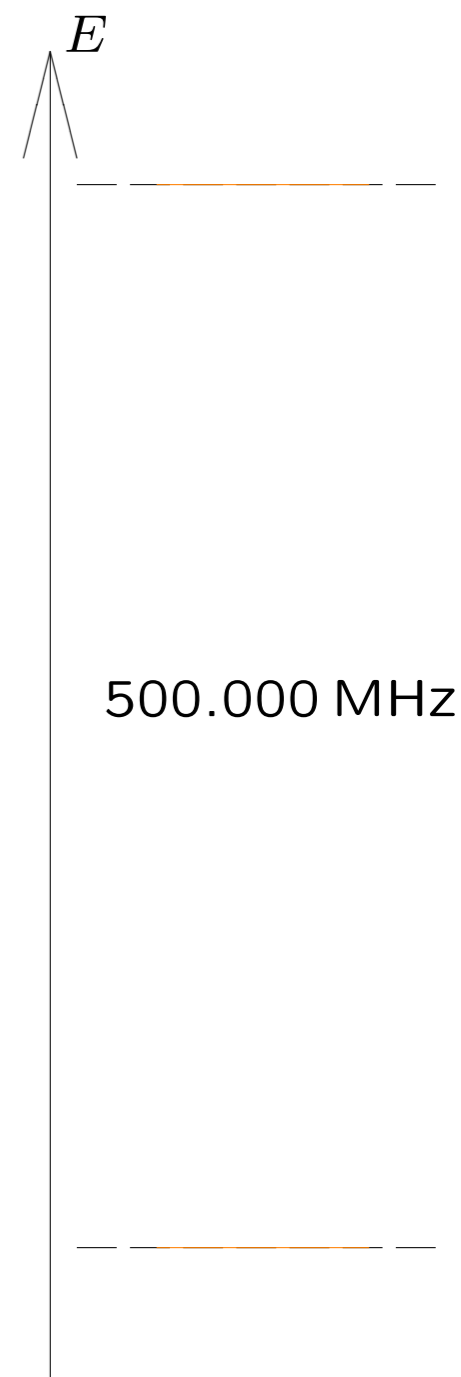
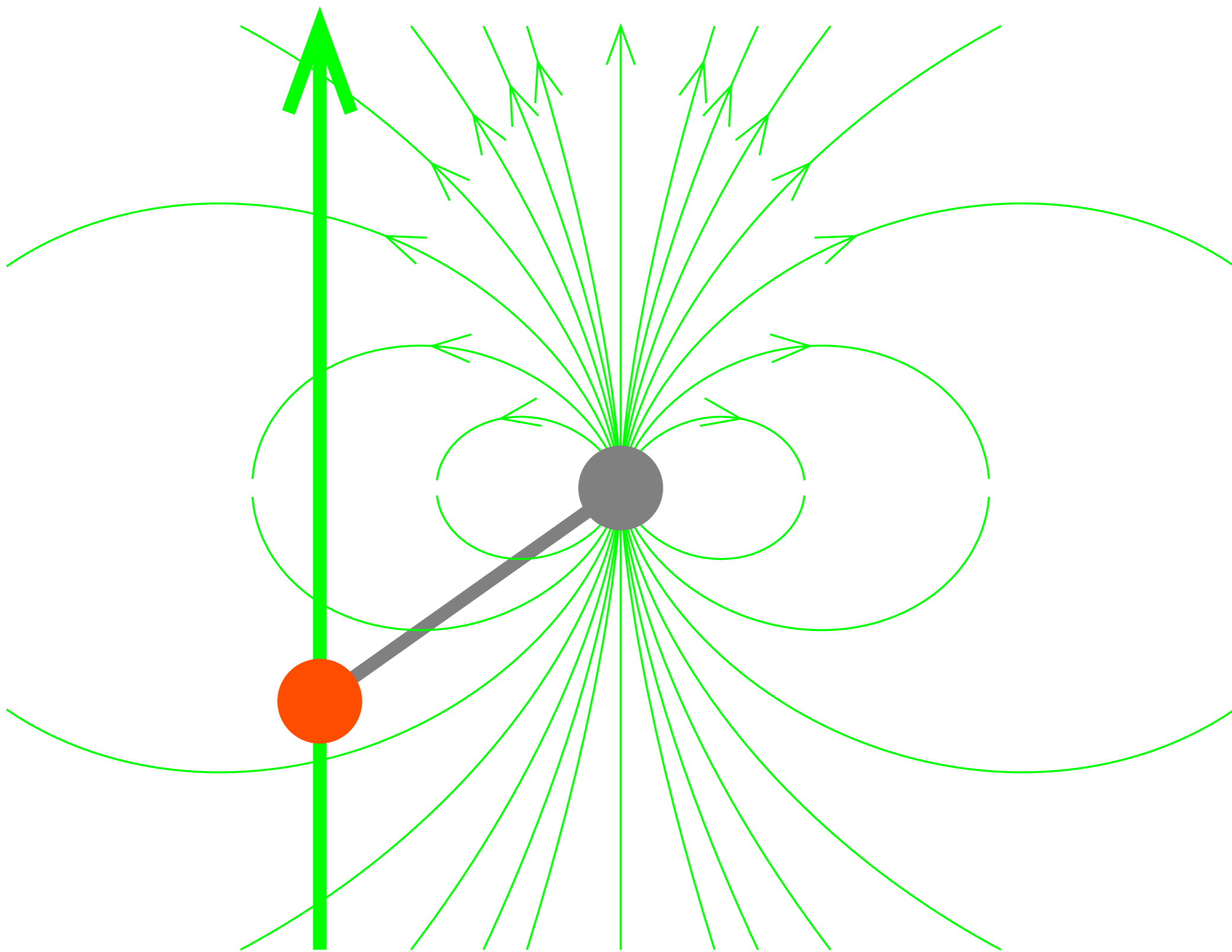
- Příjímač vypnut, vysílač zapnut: **Excitace**
- Příjímač zapnut, vysílač vypnut: **Detekce**
- Příjímač vypnut, vysílač vypnut: **Relaxace**

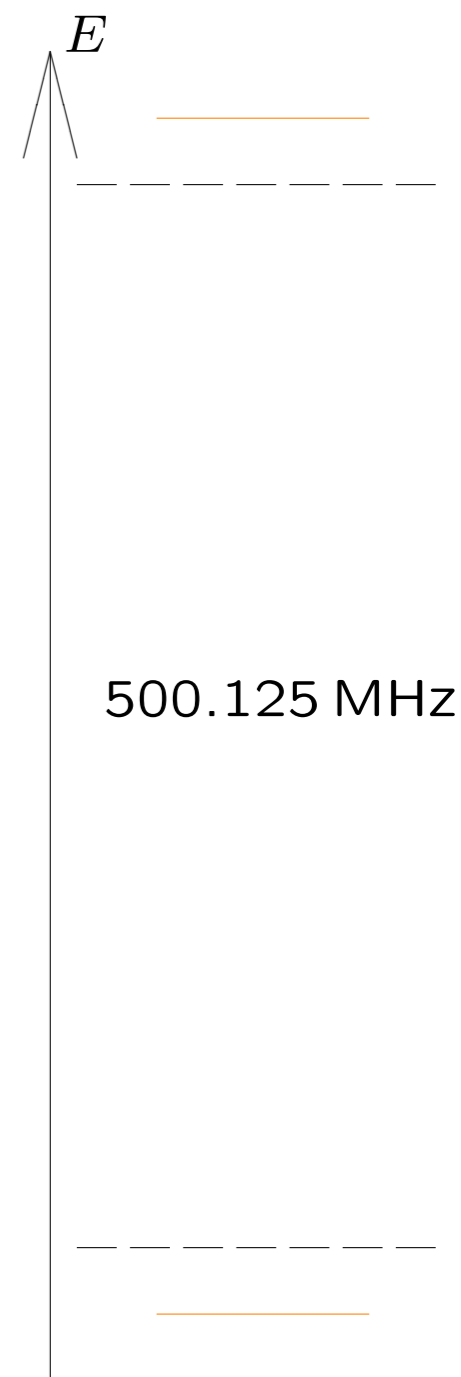
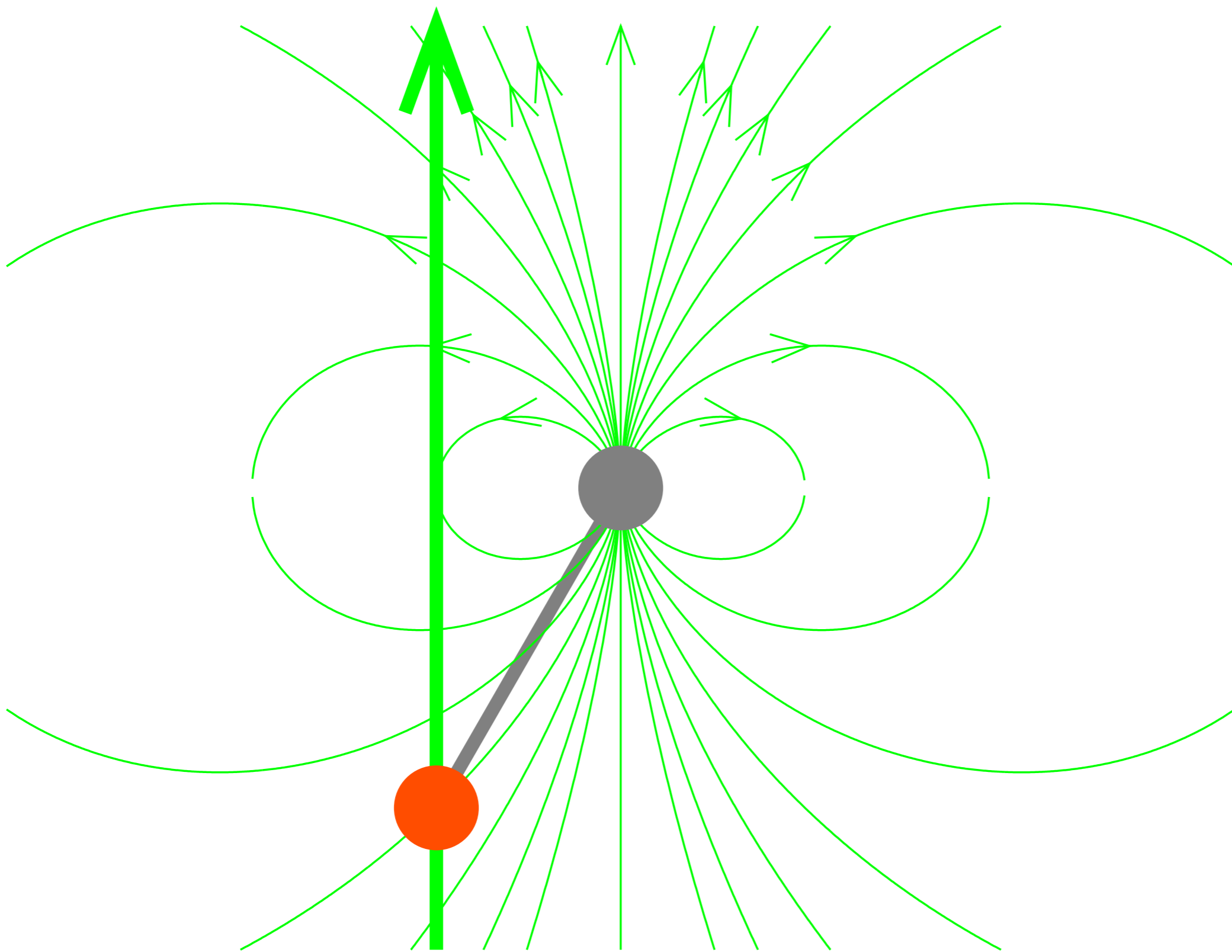
## Magnetická pole v molekule:

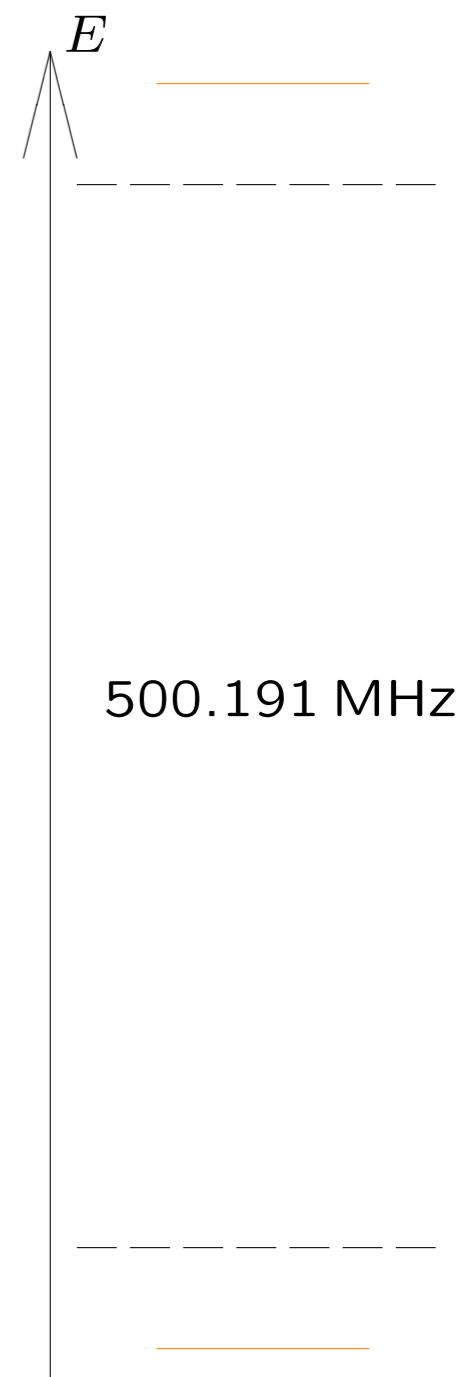
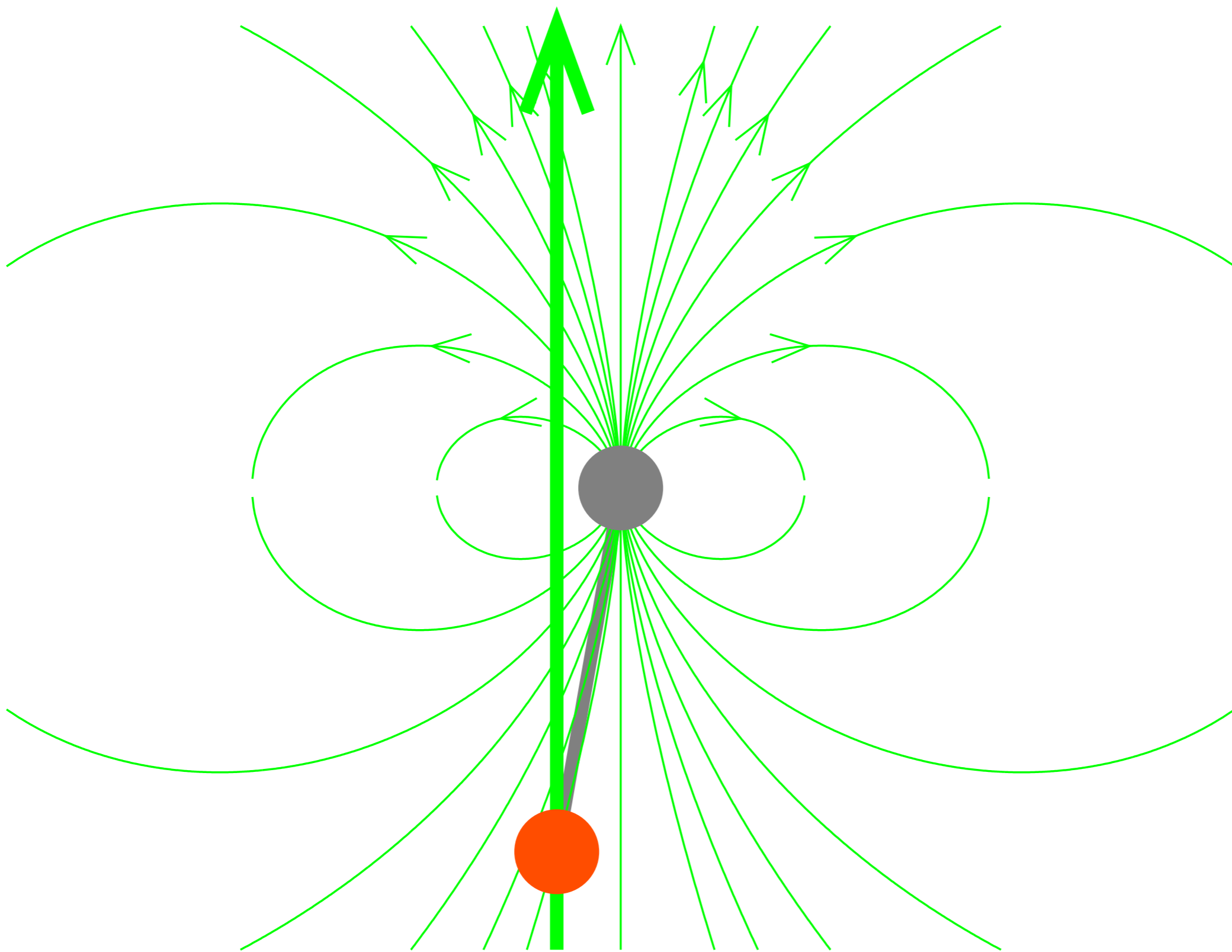
- Přímá interakce s ostatními jádry
- Interakce s elektrony
- Interakce s jádry zprostředkovaná elektrony

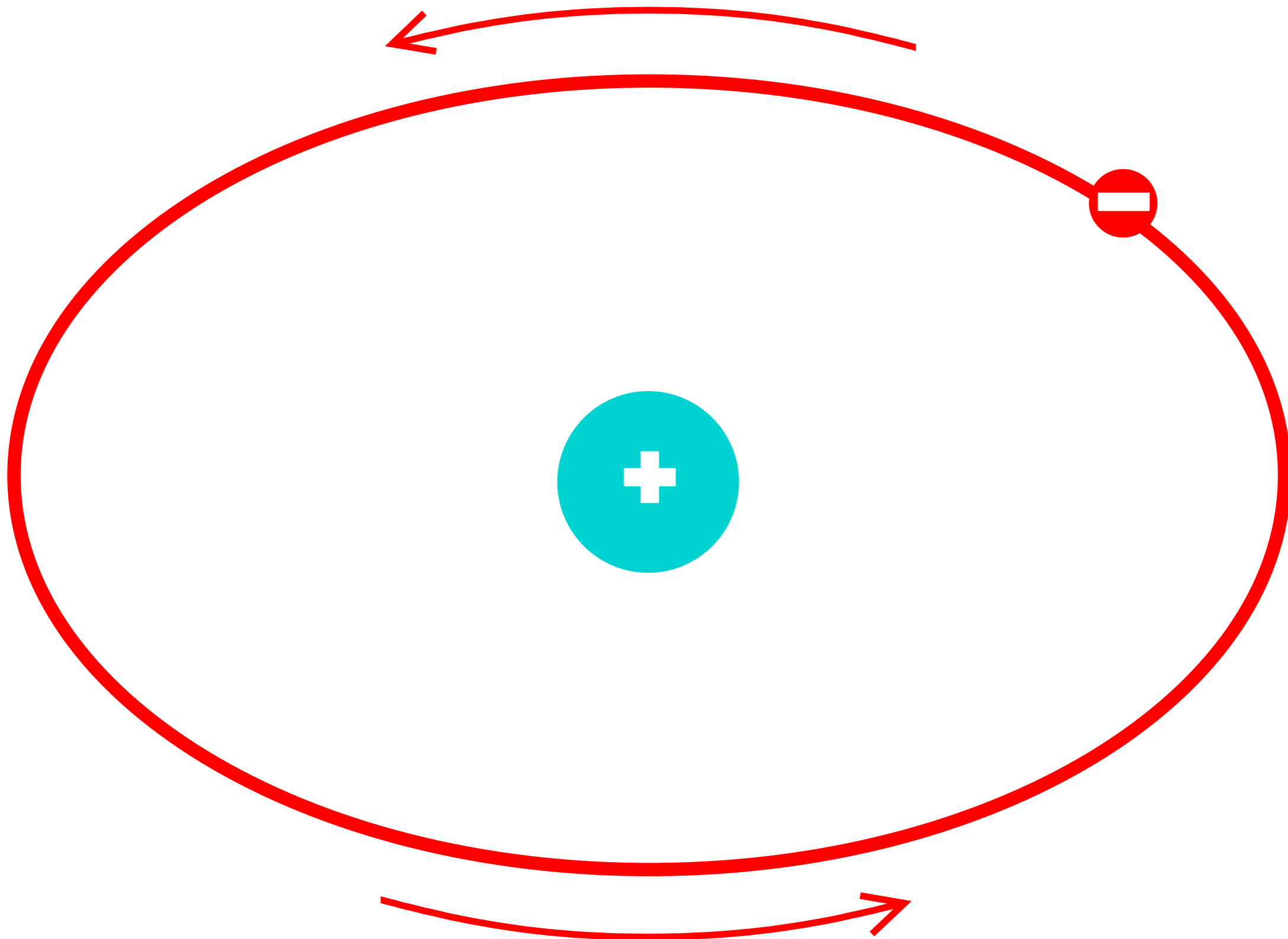




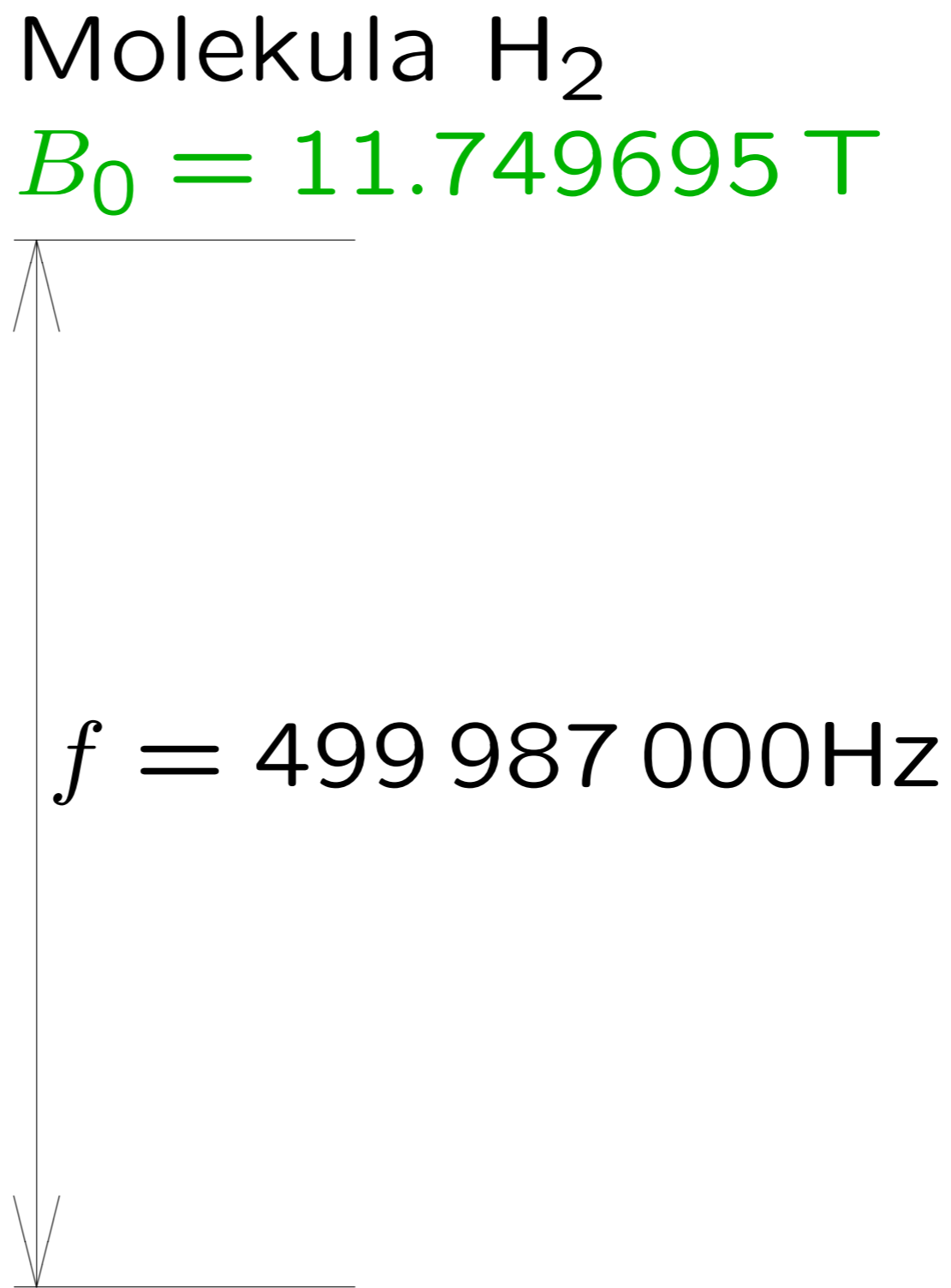
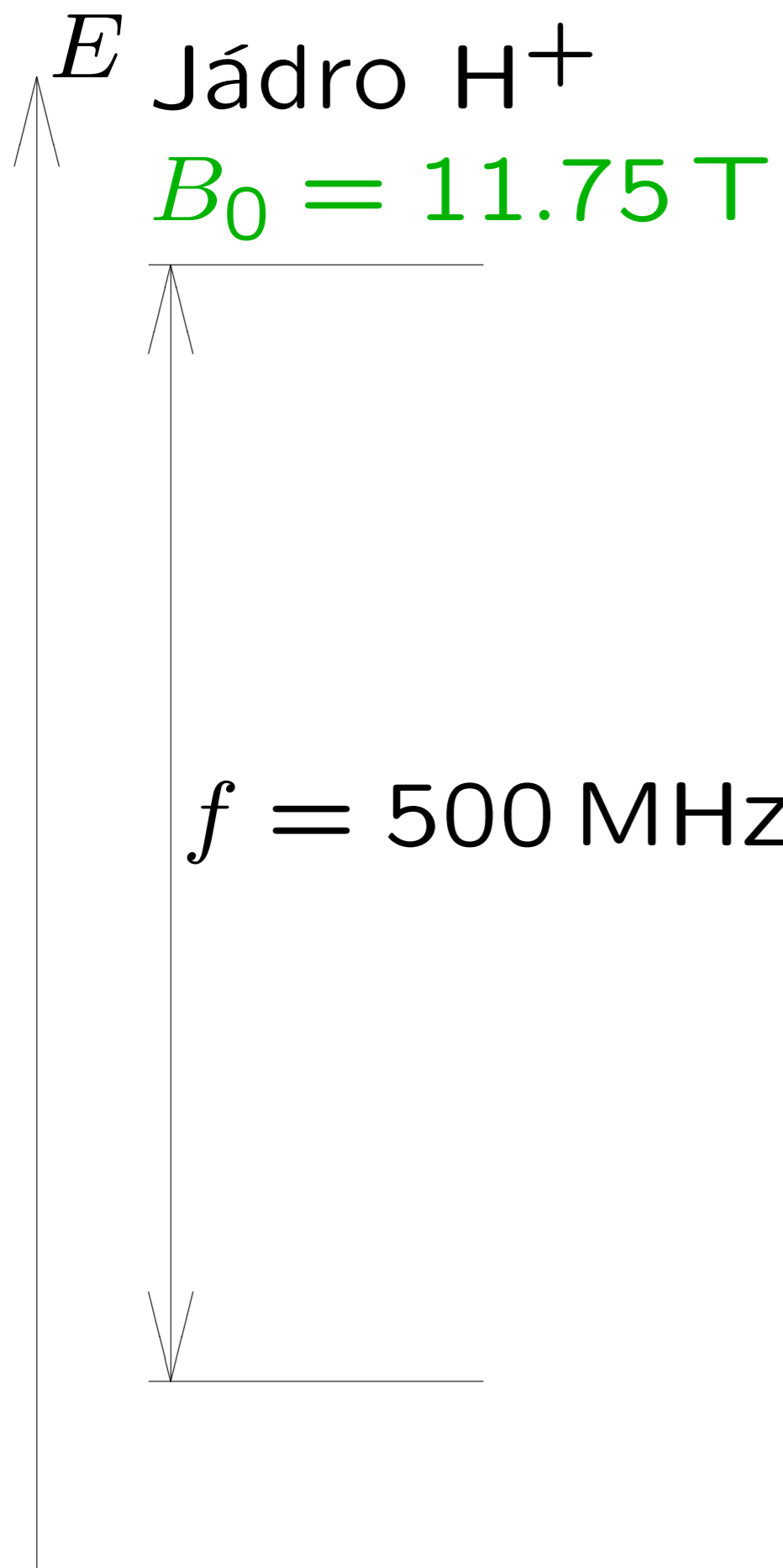


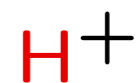
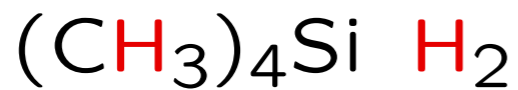
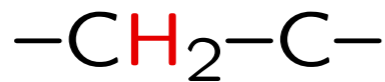
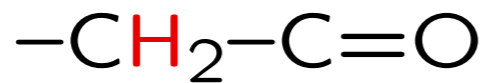
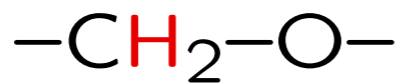
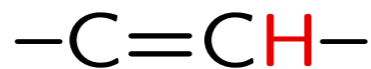
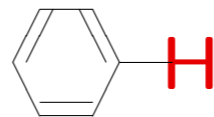
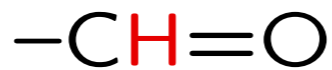










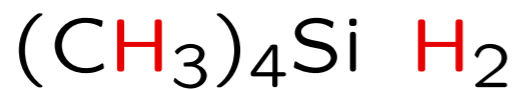
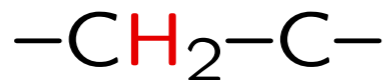
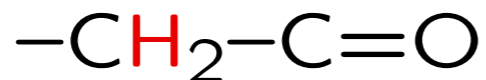
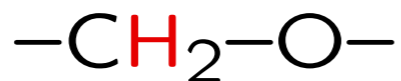
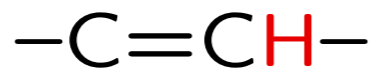
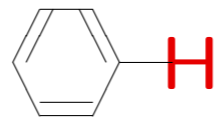


499.9985

499.9990

499.9995

500.0000 MHz

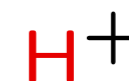
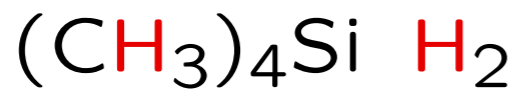
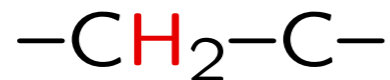
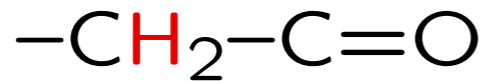
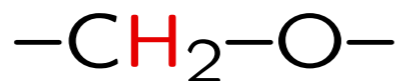
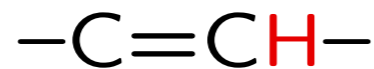
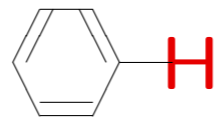
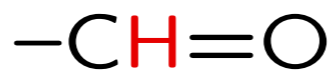


99.997 %

99.998 %

99.999 %

100.000 %



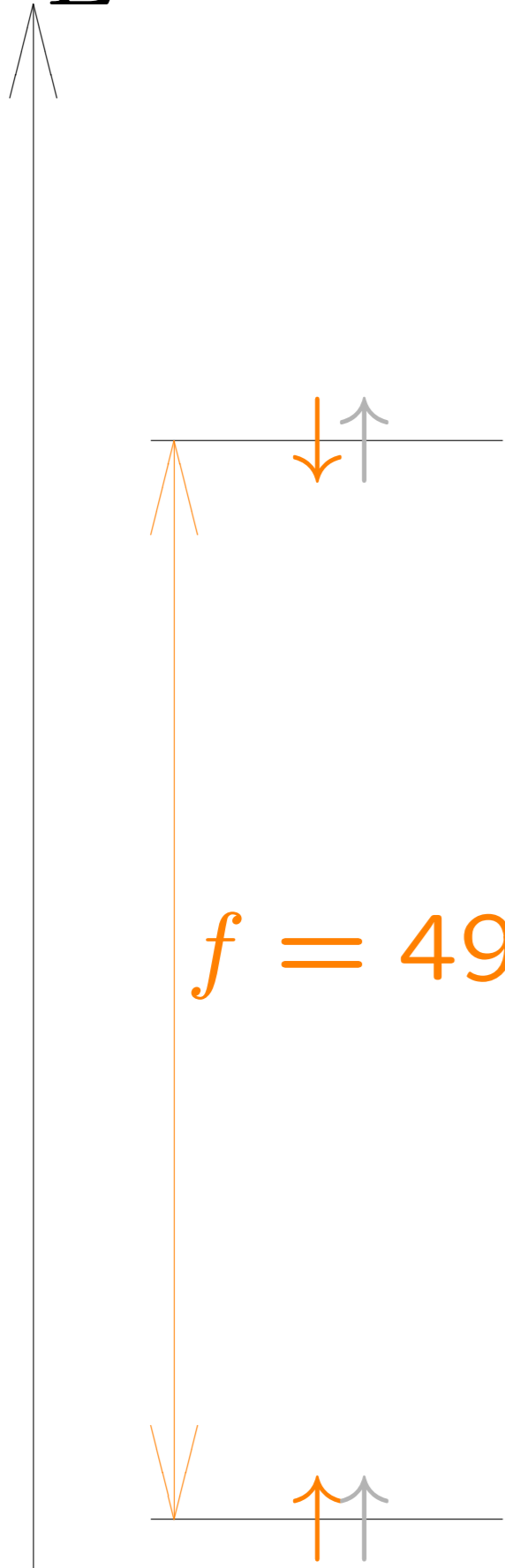
0 ppm

10 ppm

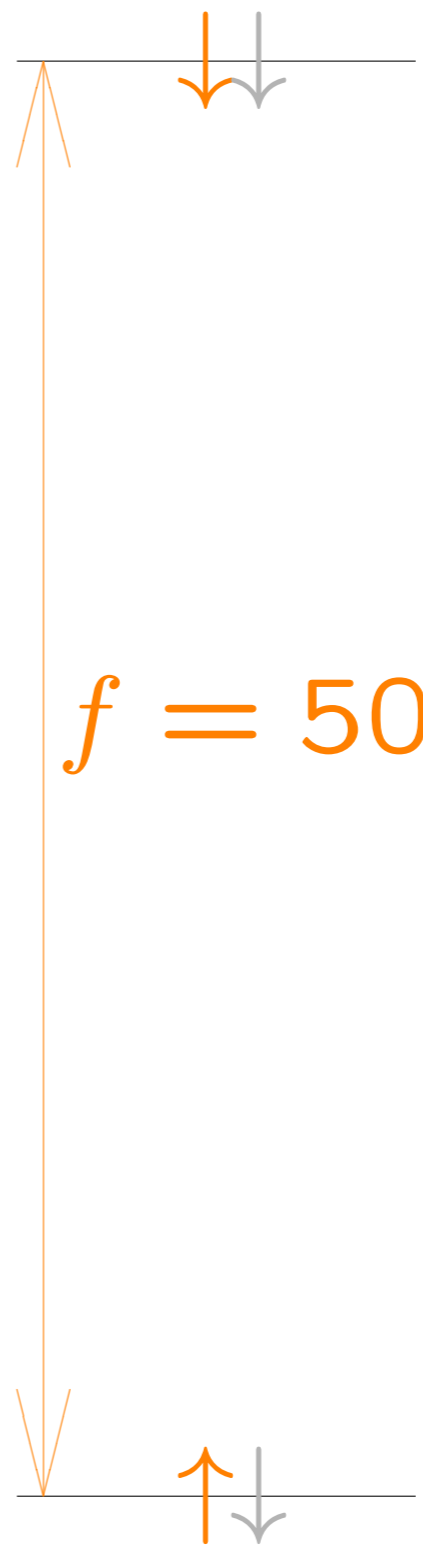
20 ppm

30 ppm

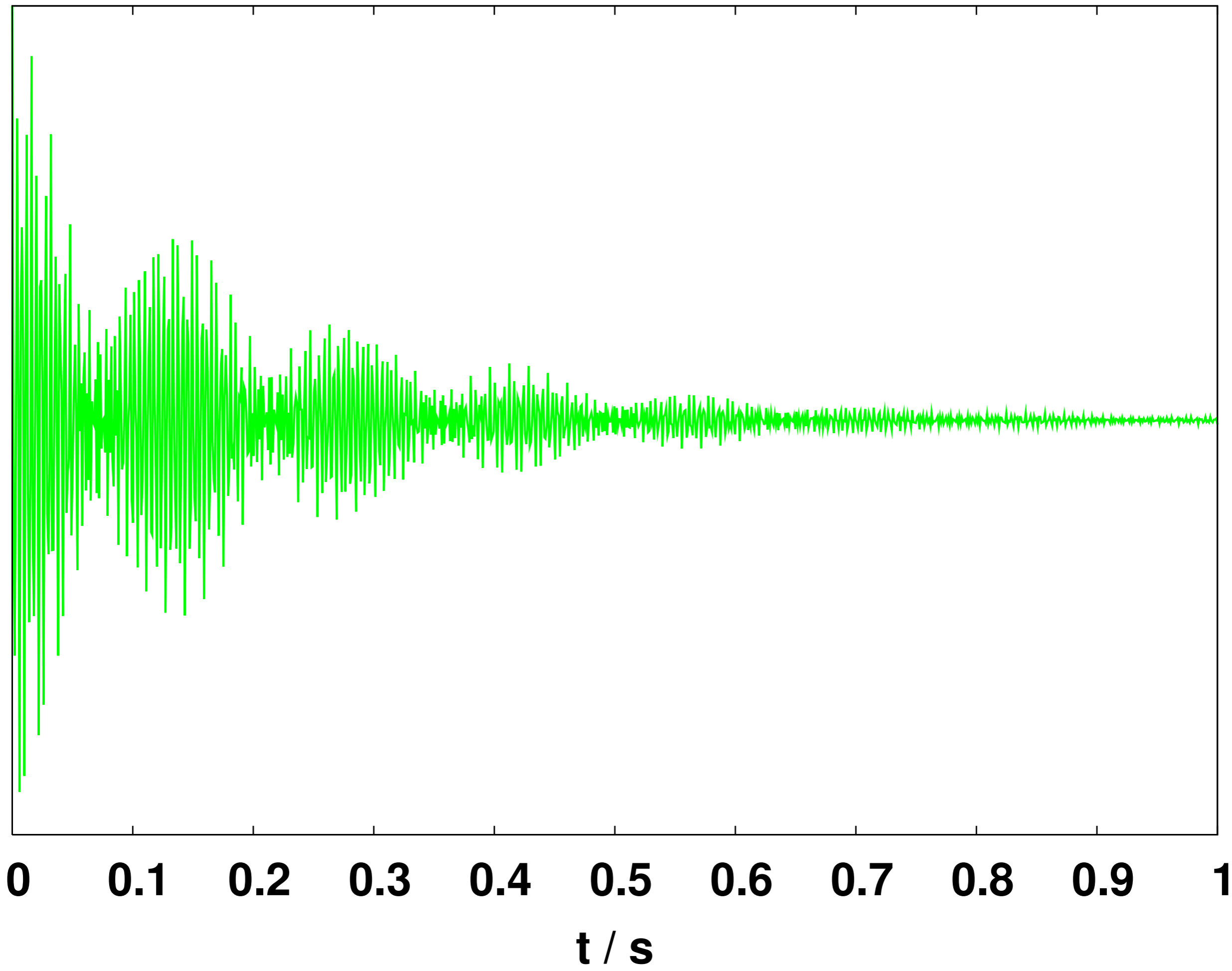
$E$

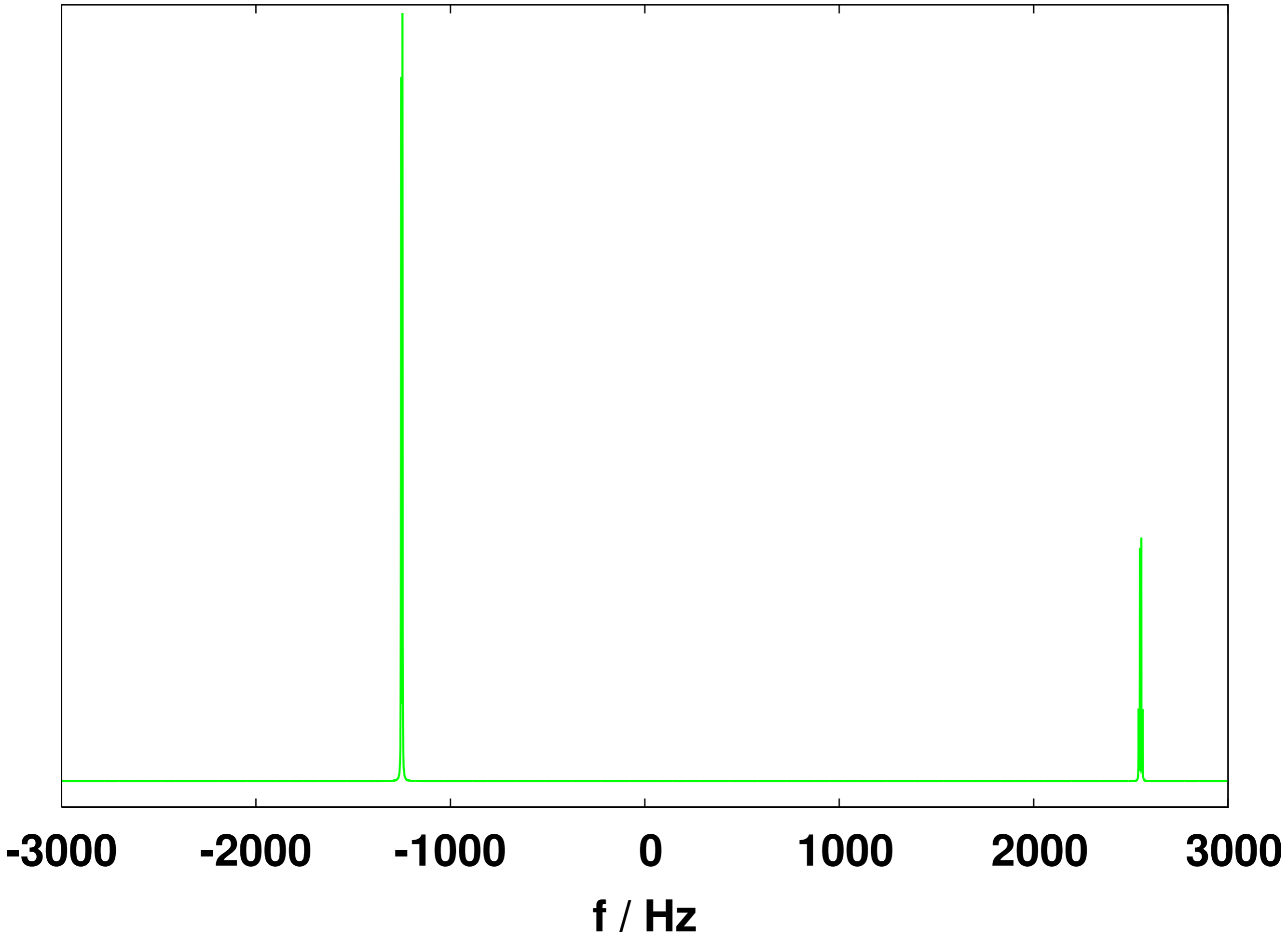


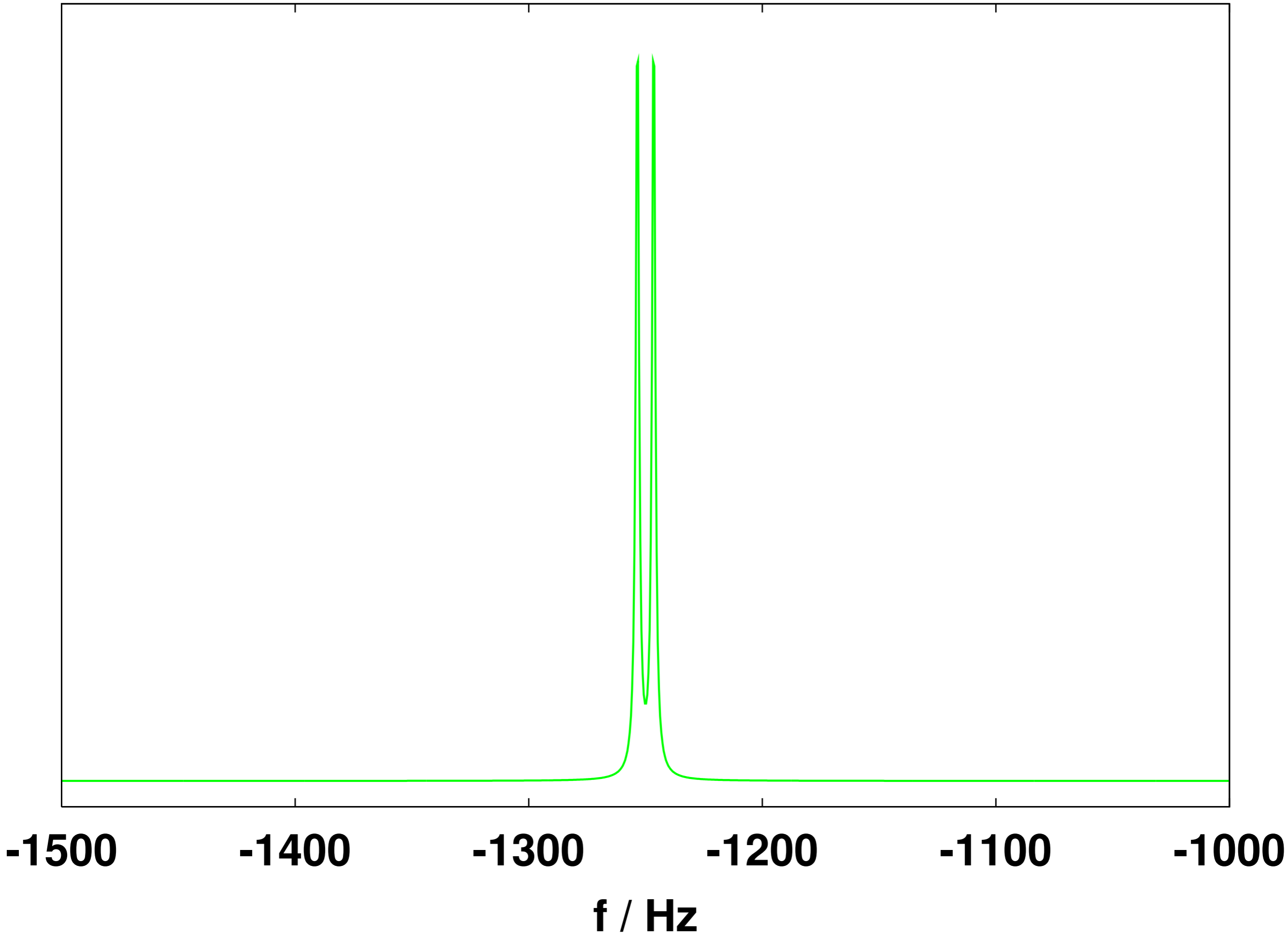
$f = 499.99998 \text{ MHz}$



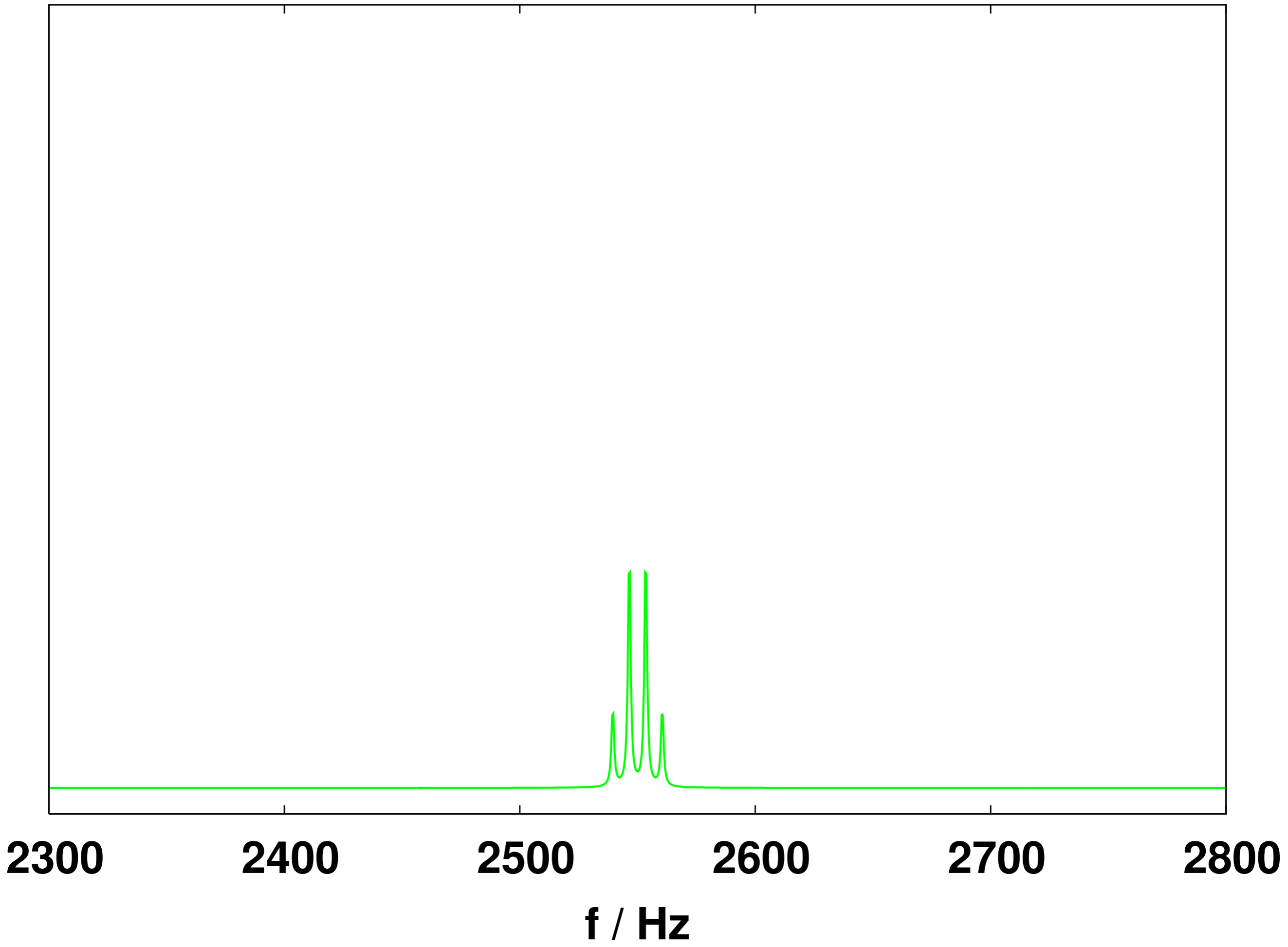
$f = 500.00002 \text{ MHz}$









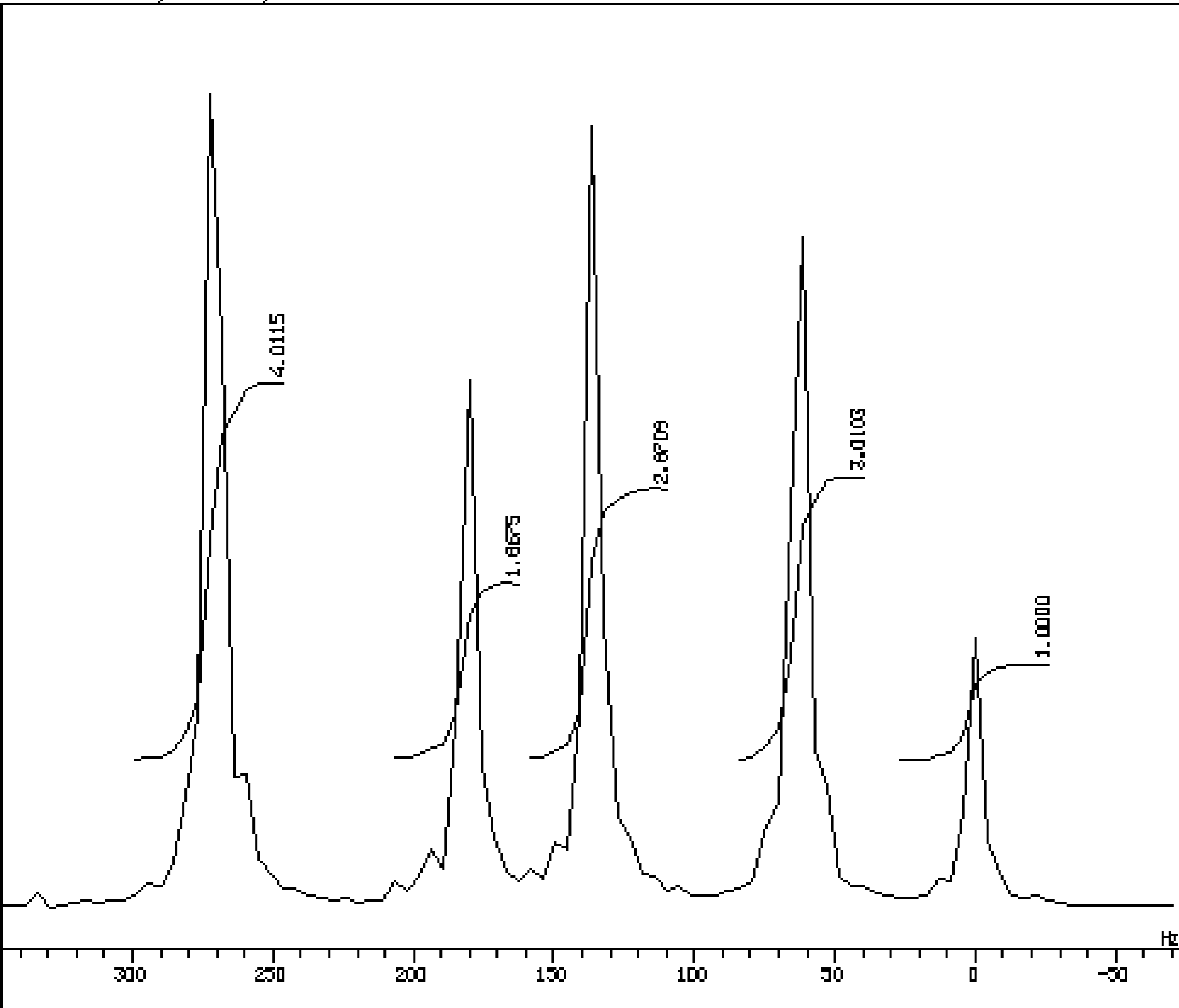


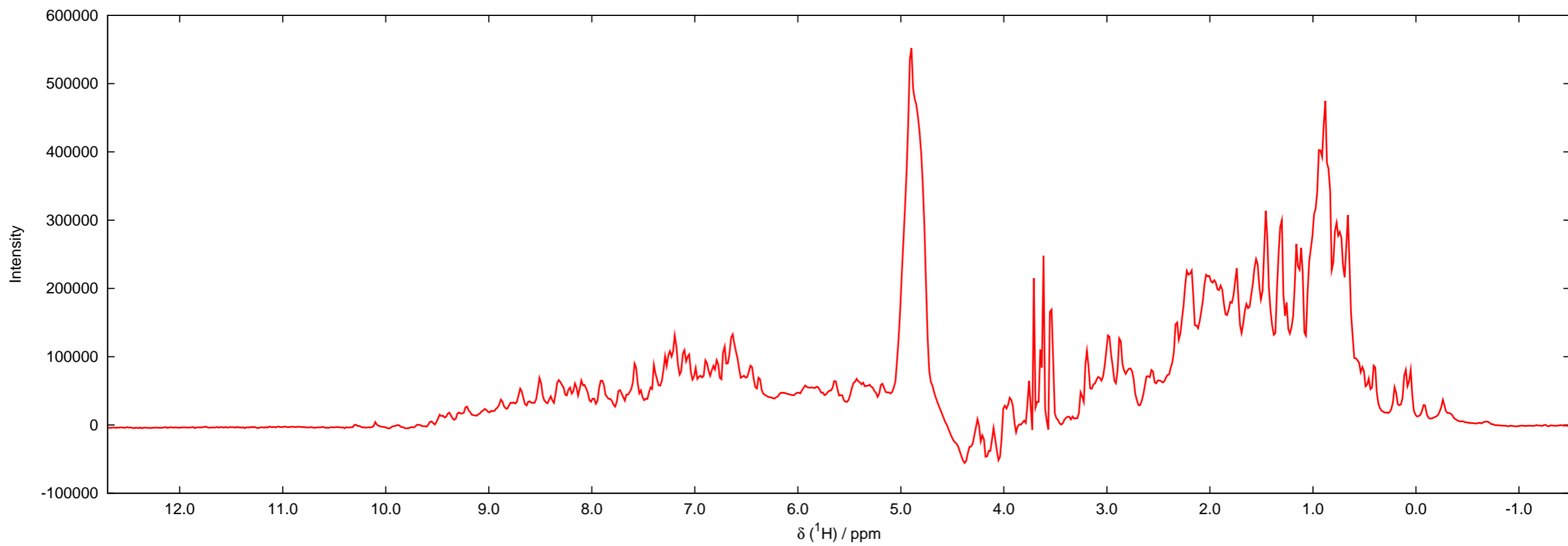
Acetaldehyd

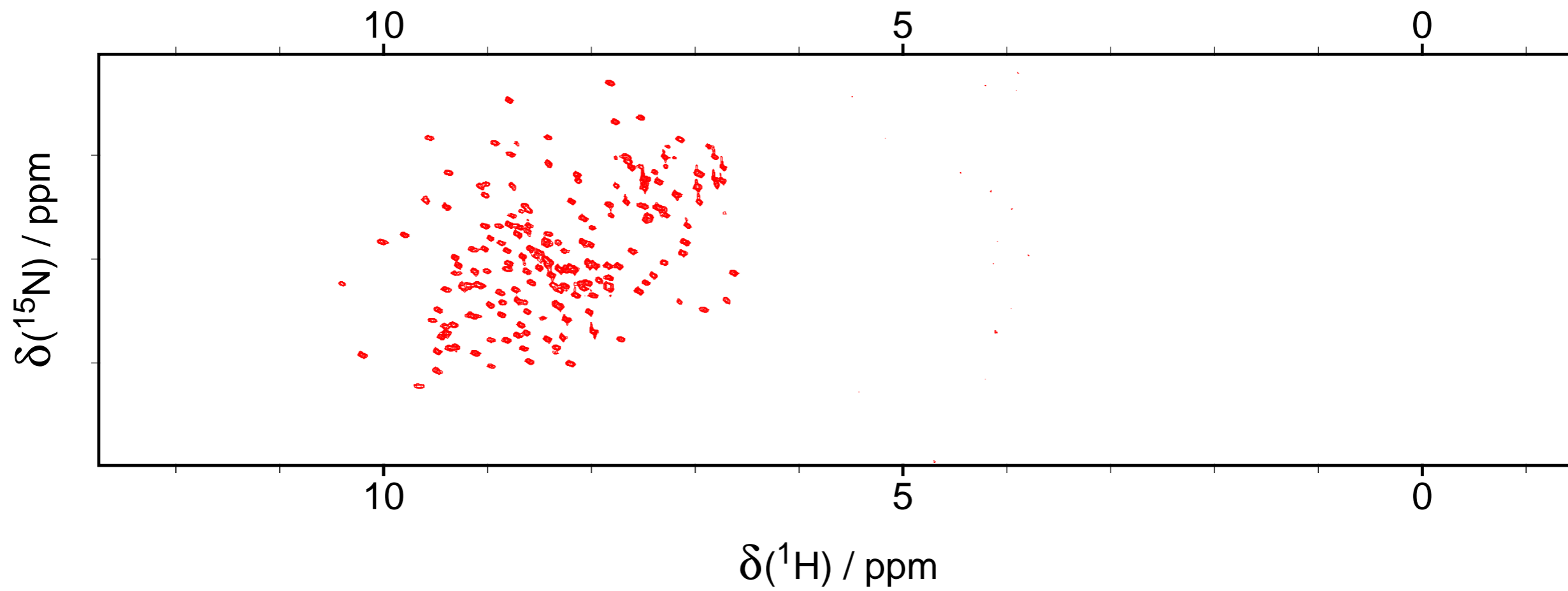
Methyl acetaldehydu

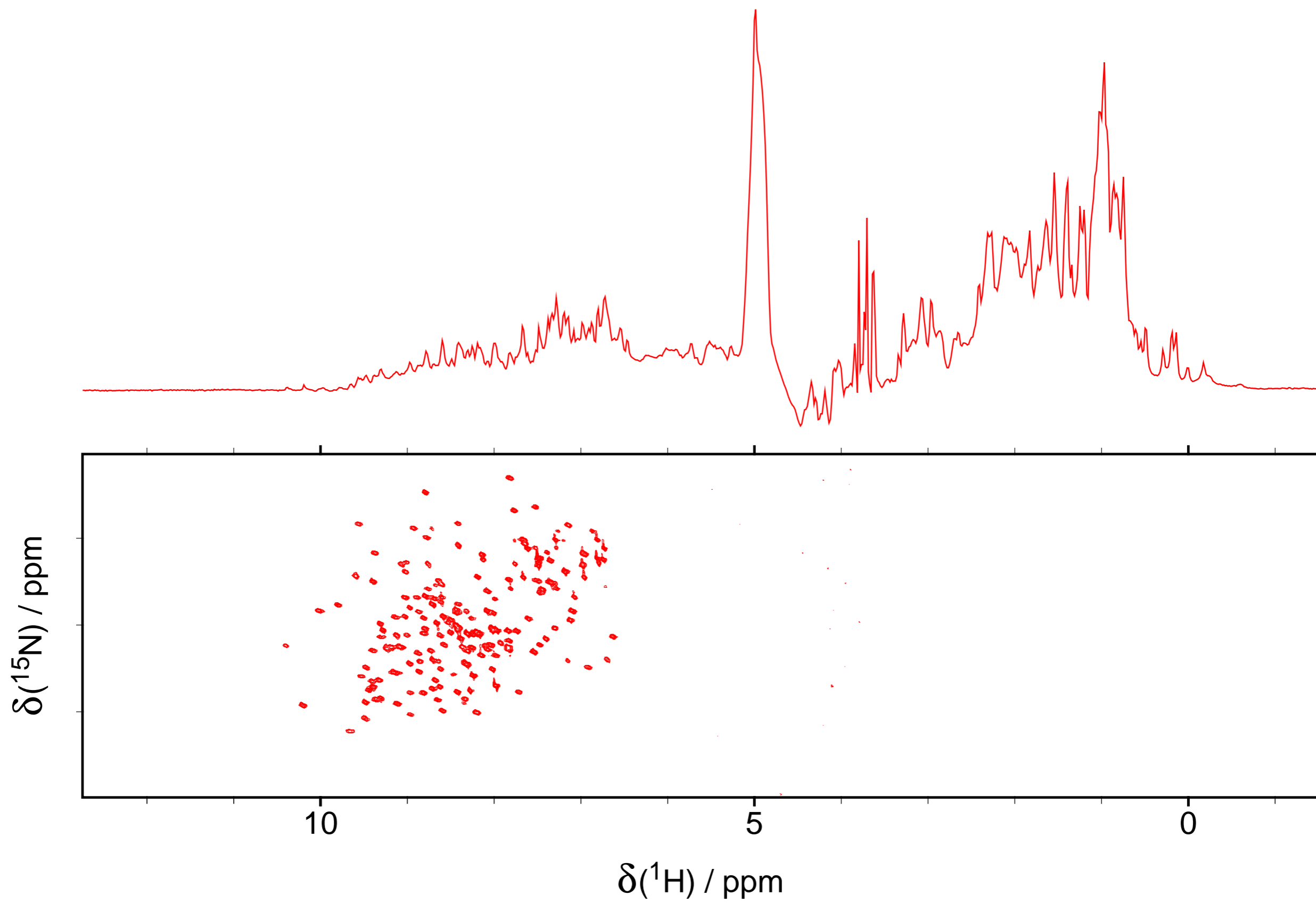
Písnička Hänschen klein

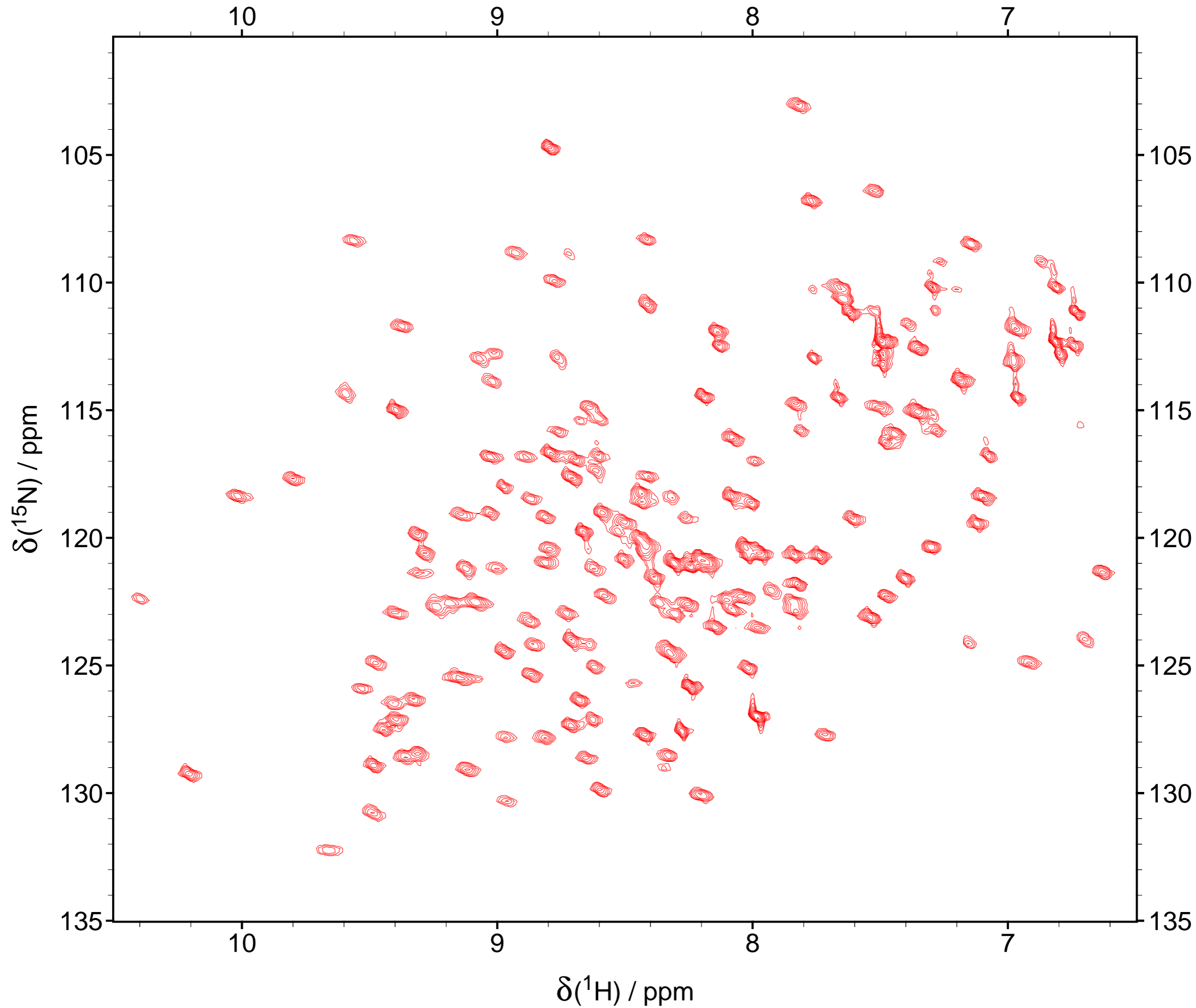
SFILE : HANS  
 EXMOD : HANS  
 IRMOD : NON  
 POINT : 2048  
 SAMPD : 2048  
 FREQU : 9000.90 Hz  
 FILTR : 4500 Hz  
 SCANS : 1  
 QUANTY : 0  
 ACQTH : 0.7275 sec  
 PD : 2.7231 sec  
 RGAIN : 10  
 PW1 : 1.00 usec  
 OBNUC : 1H  
 OBFRQ : 500.00 MHz  
 OBSET : 160200.00 Hz  
 IRNUC : 13C  
 IRFRQ : 125.65 MHz  
 IRSET : 127958.00 Hz  
 IRATN : 511  
 IRRPW : 50.0 usec  
 IRBP1 : 50  
 IRBP2 : 6  
 IRNS : 0  
 TRNUC : 1H  
 TRFRQ : 500.00 MHz  
 TRSET : 162410.00 Hz  
 TRATN : 511  
 TRRPW : 50.0 usec  
 TRBP1 : 30  
 TRBP2 : 6  
 TRNS : 0  
 CTEMP : 24.1 c  
 CSPED : 11 Hz  
 SLVNT : C6D6  
 RESOL : 4.39 Hz  
 NNUC : 8  
 BF : 0.10 Hz  
 GF : 0.00 Hz  
 PF : 840 cp  
 ABSFO : -92.11 deg  
 ABSF1 : 0.00 deg  
 T1 : 0.00 s  
 T2 : 0.00 s  
 T3 : 90.00 s  
 T4 : 100.00 s  
 REFVL : 0.00 ppm  
 T19F : 902  
 XE : 421.92 Hz  
 XS : -676.83 Hz  
 Y6 : 0.001

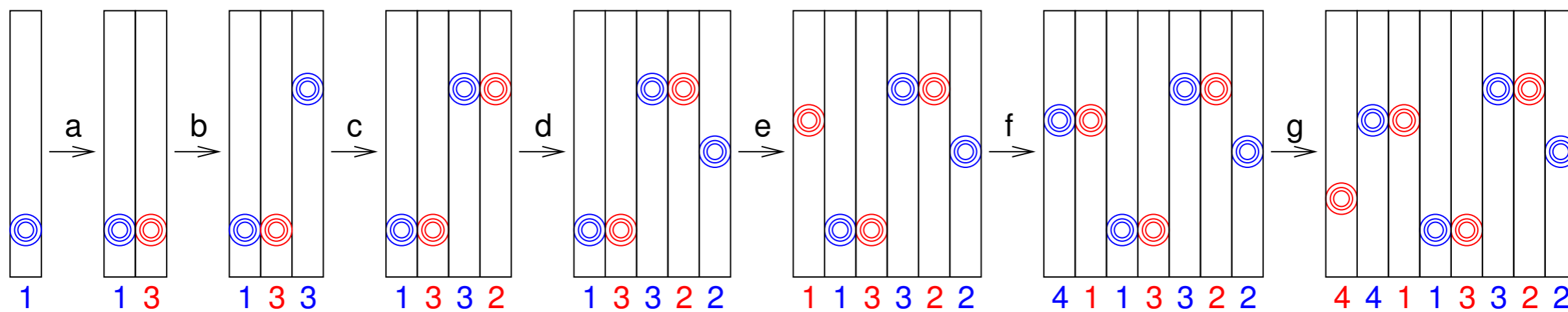
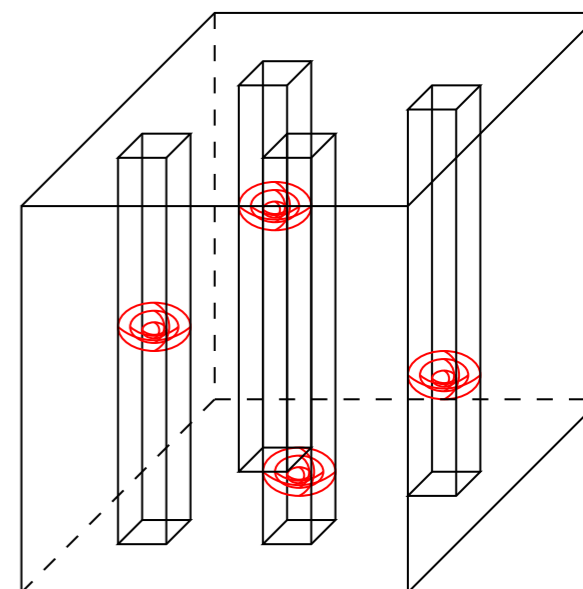
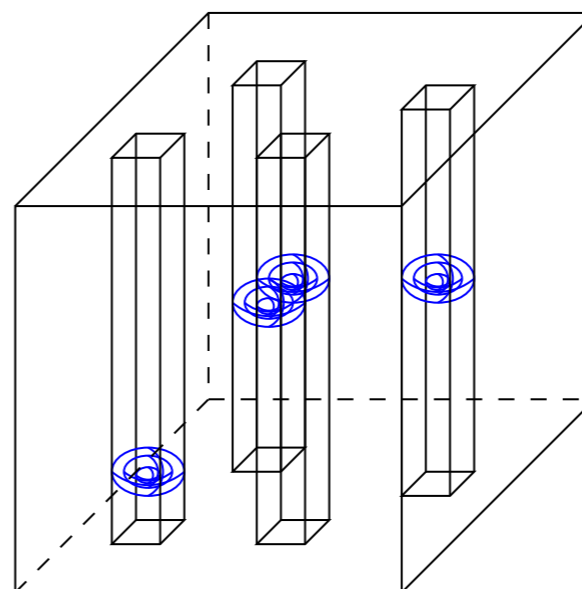
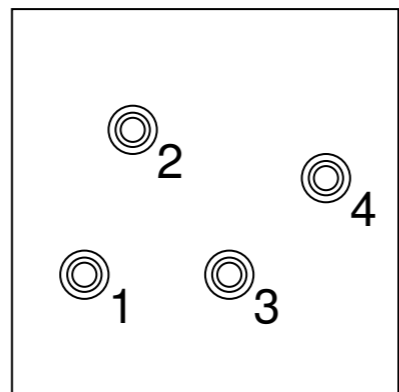
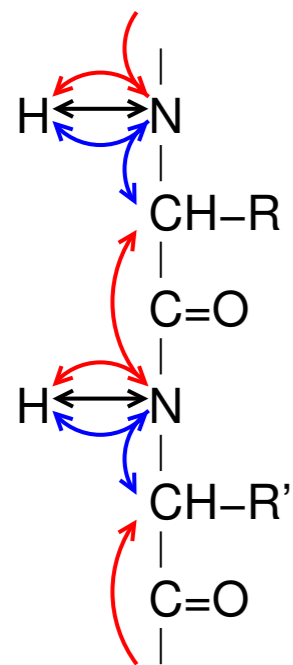




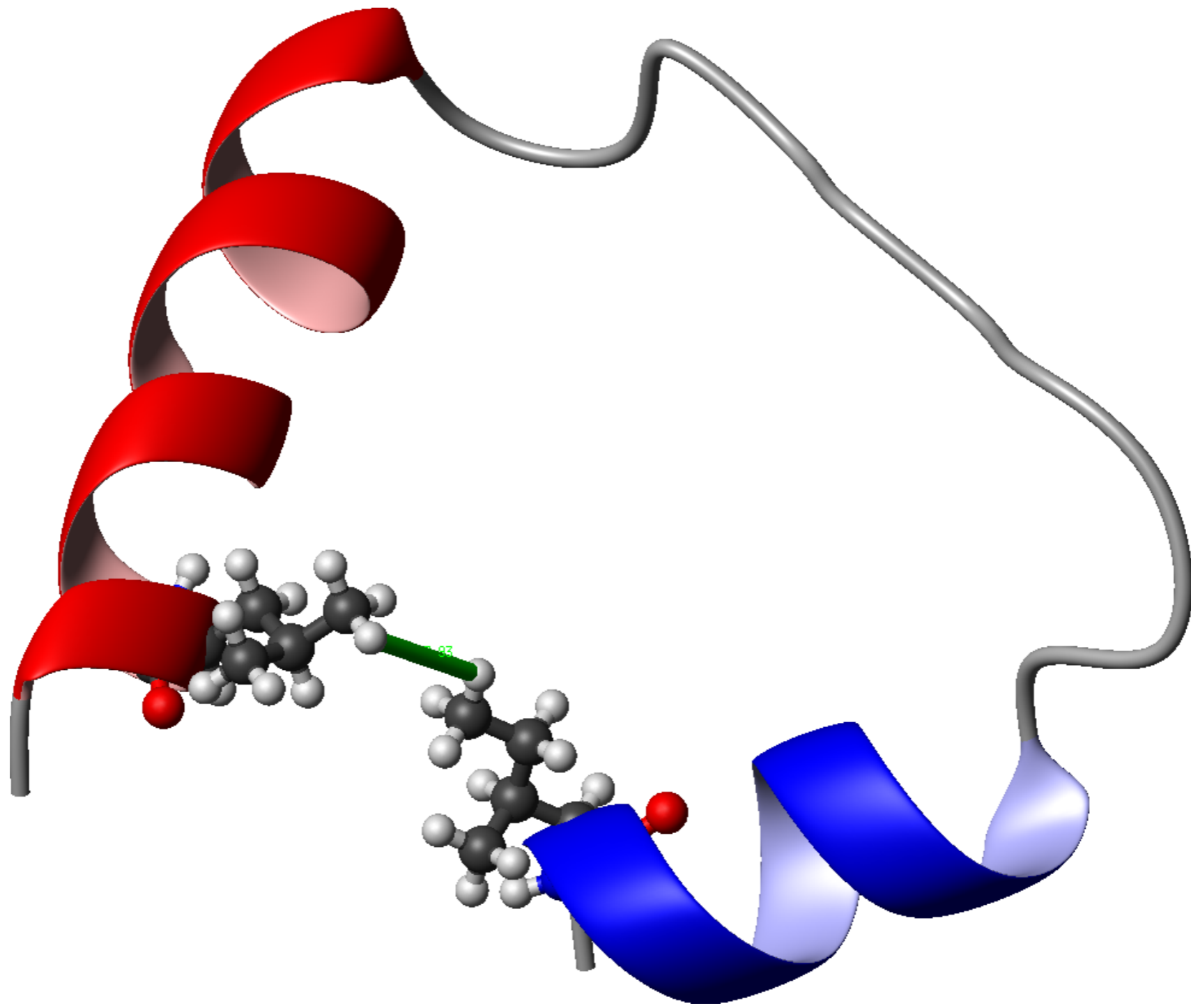


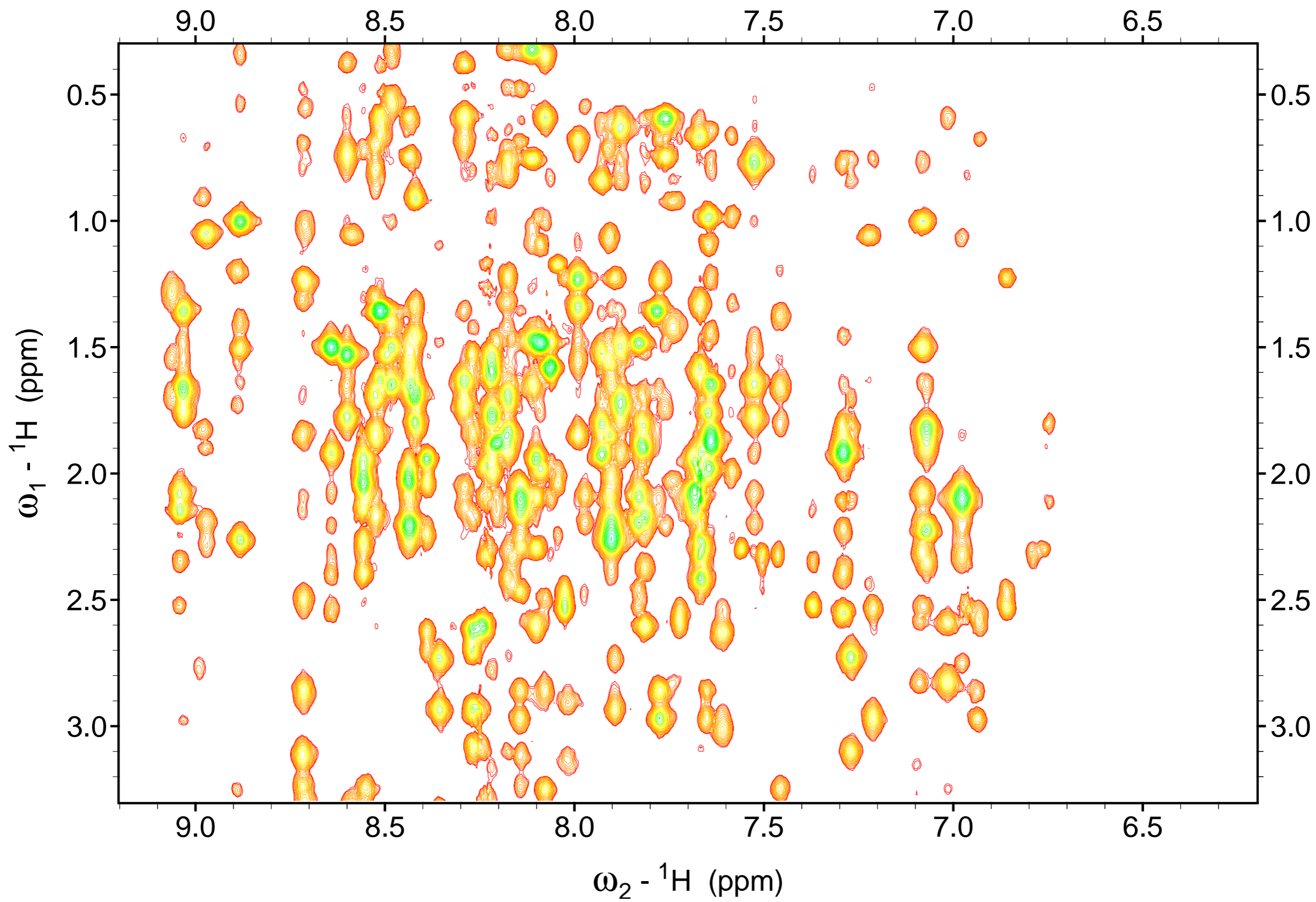


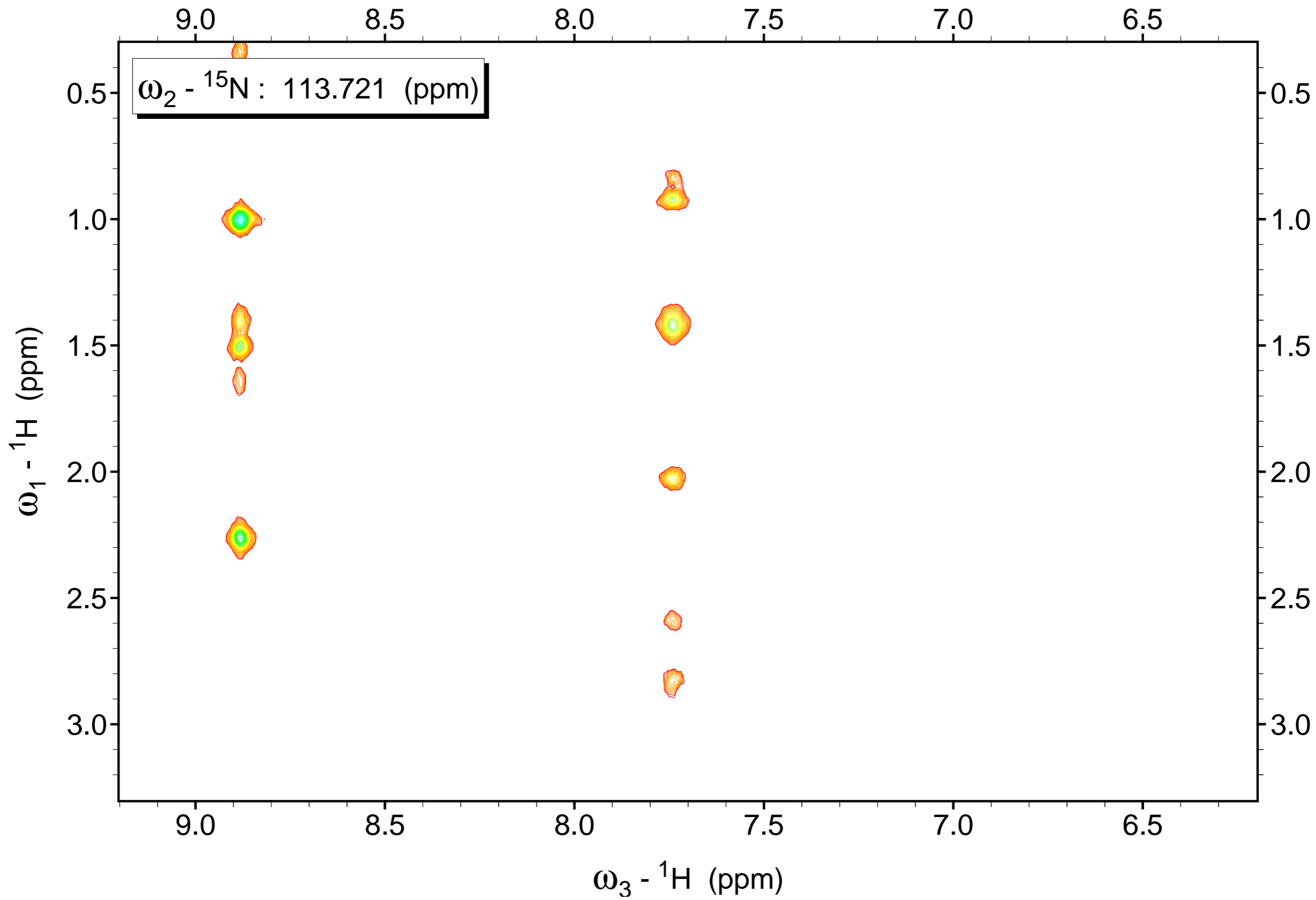


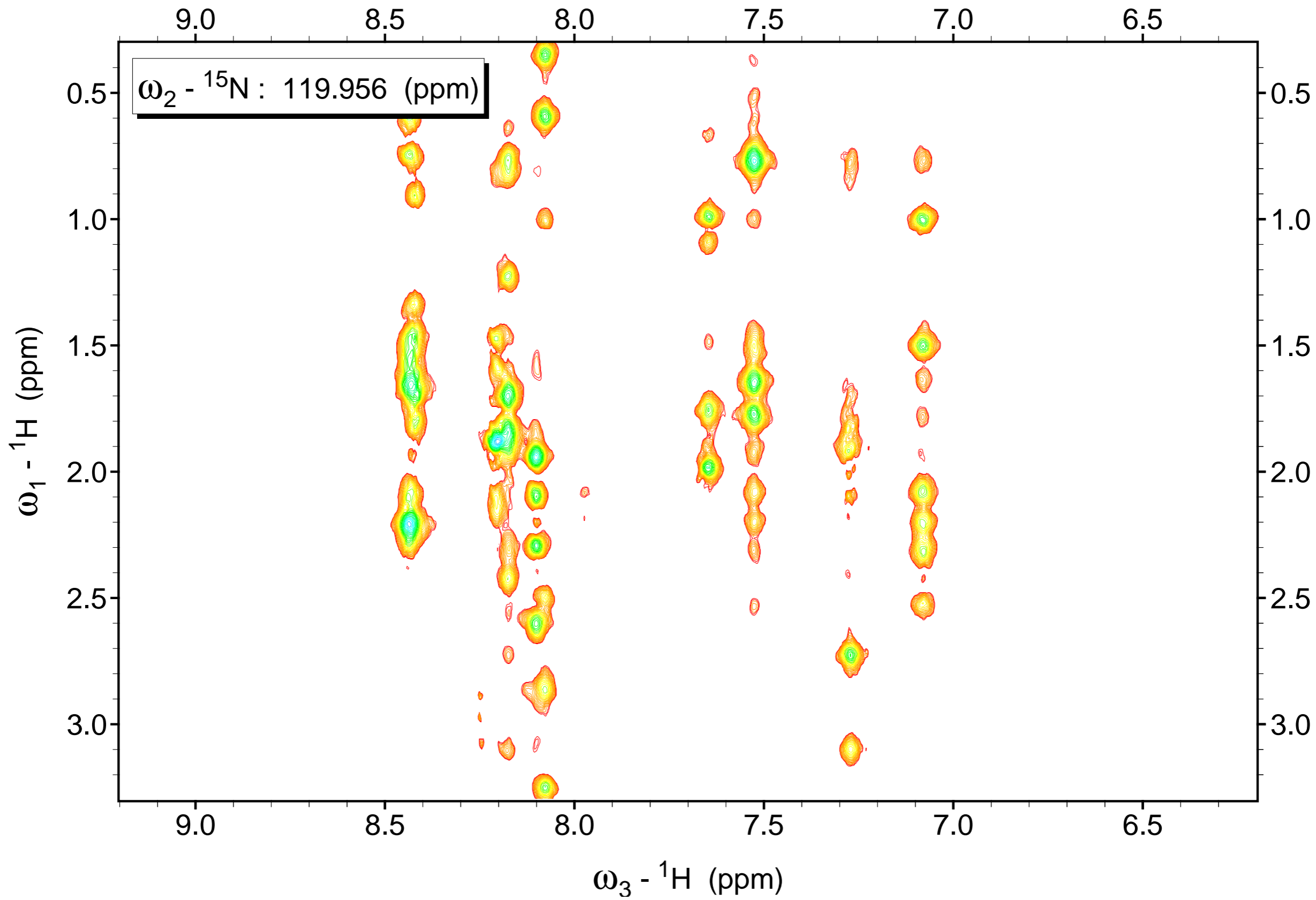


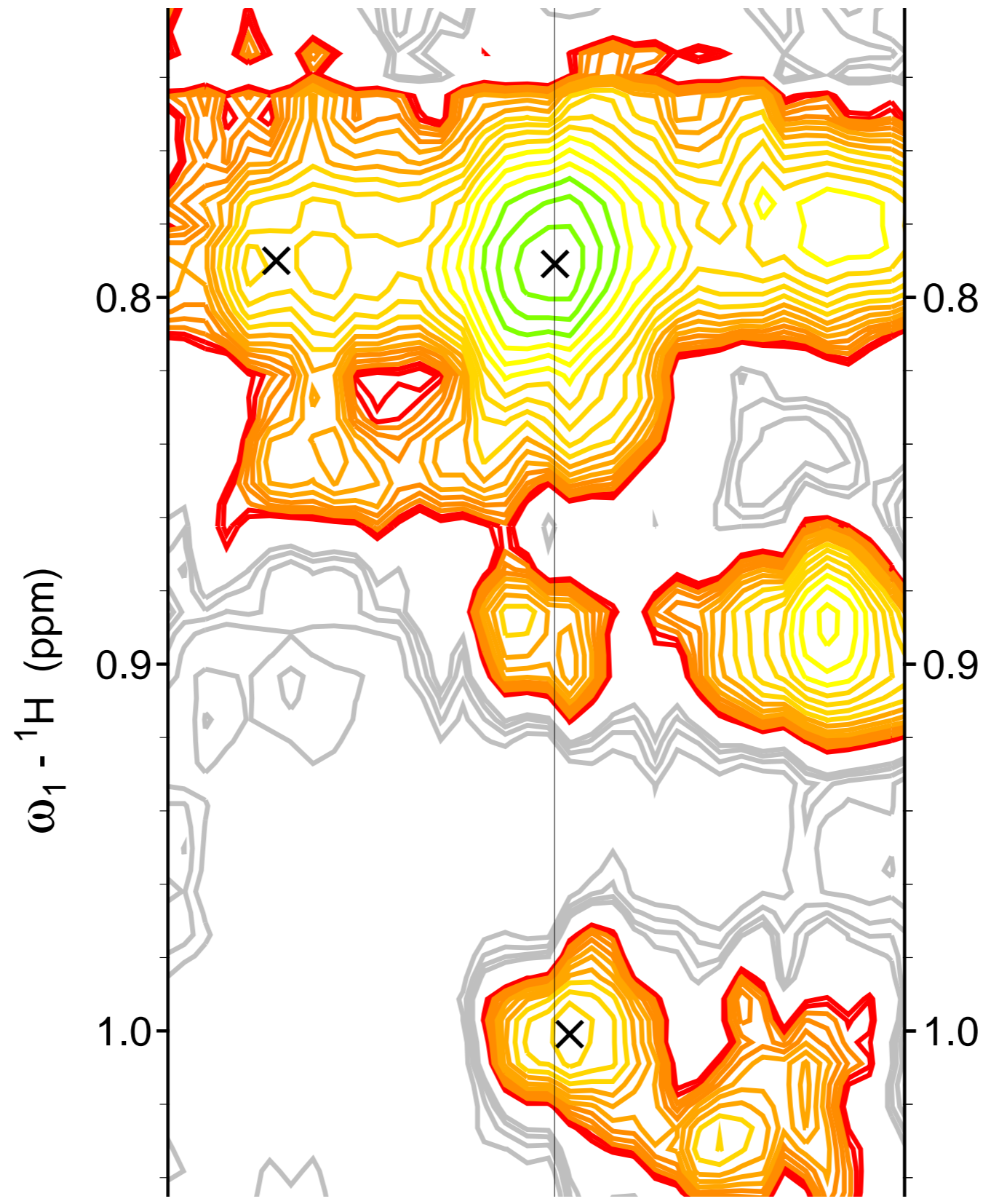


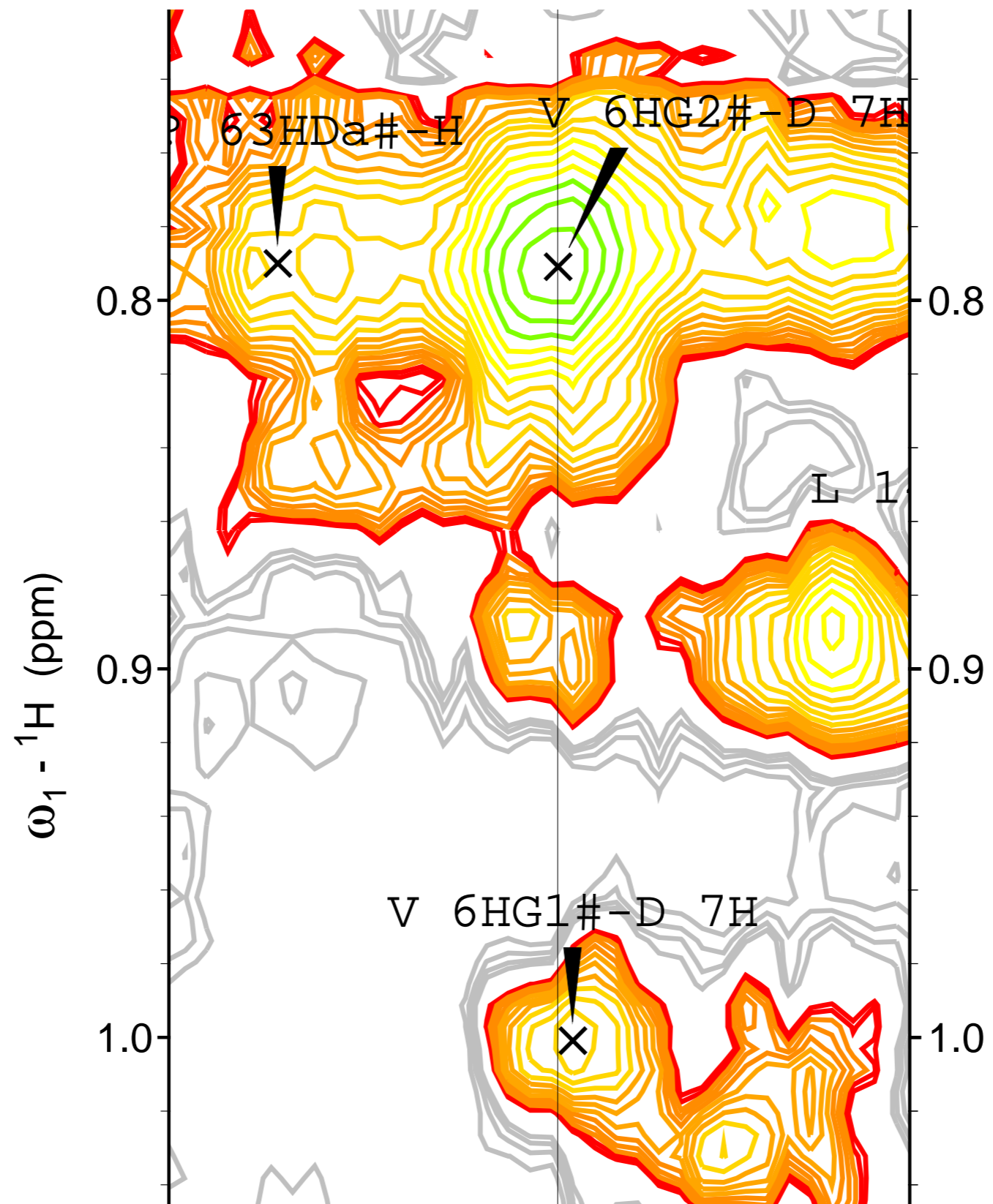












$$\frac{S}{S_{\text{ref}}} = \left(\frac{r_{\text{ref}}}{r}\right)^6 \quad (1)$$

$$r = r_{\text{ref}} \sqrt[6]{\frac{S_{\text{ref}}}{S}} \quad (2)$$

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## Známé vzdálenosti protonů

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|                                     |            |         |
|-------------------------------------|------------|---------|
| geminální v CH <sub>2</sub> skupině | H-C-H      | 0.17 nm |
| <i>ortho</i> v aromatickém kruhu    | H-C=C-H    | 0.25 nm |
| <i>meta</i> v aromatickém kruhu     | H-C=CH-C-H | 0.42 nm |

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