



Modelling of NV diamond quantum chip with electrical readout of spins states

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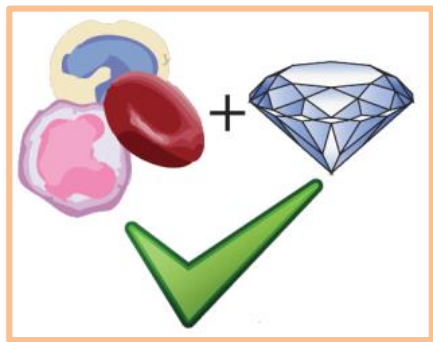
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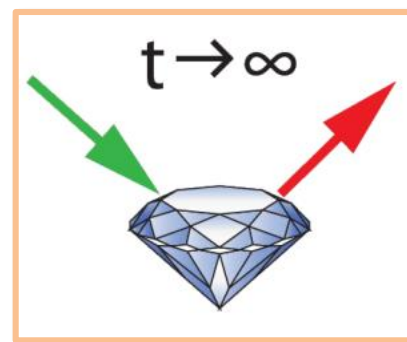
IMO-IMOMEC



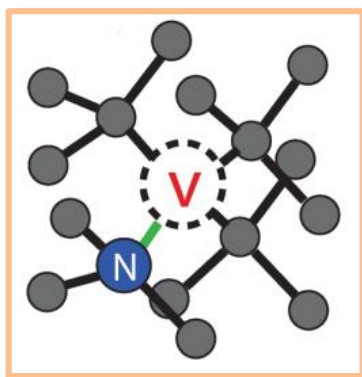
Diamant jako materiál



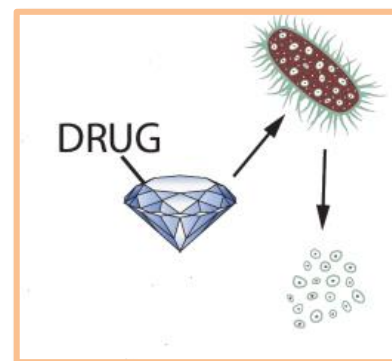
Biokompatibilní



Fotostabilita

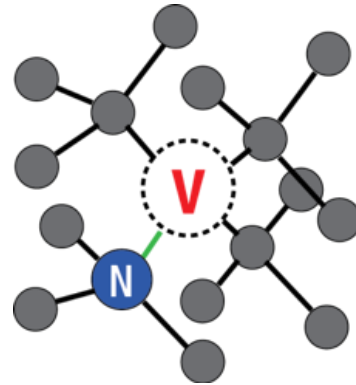


Luminiscence



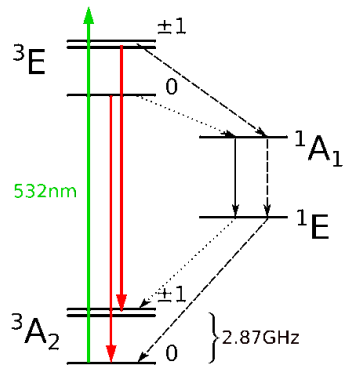
Přenos léčiva

NV defekt pro kvantové technologie



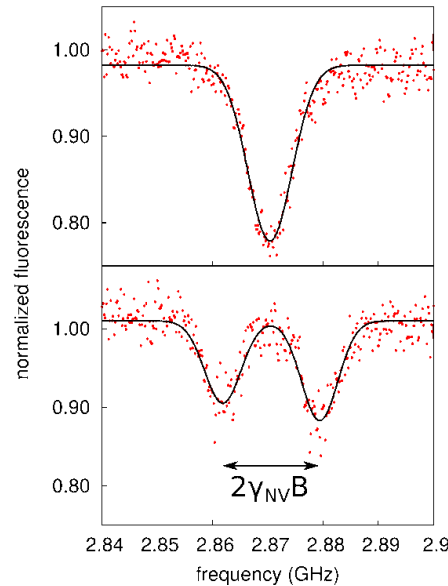
NV⁻ 6 elektronu
NV⁰ 5 elektronu
NV⁺ 4 elektrony

a)



[1]

b)



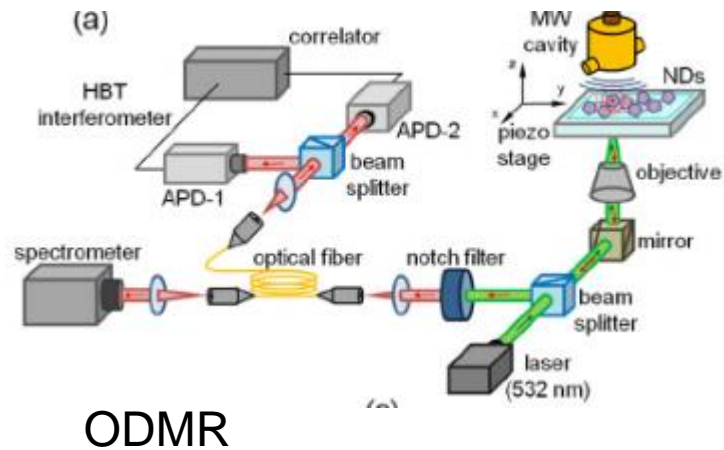
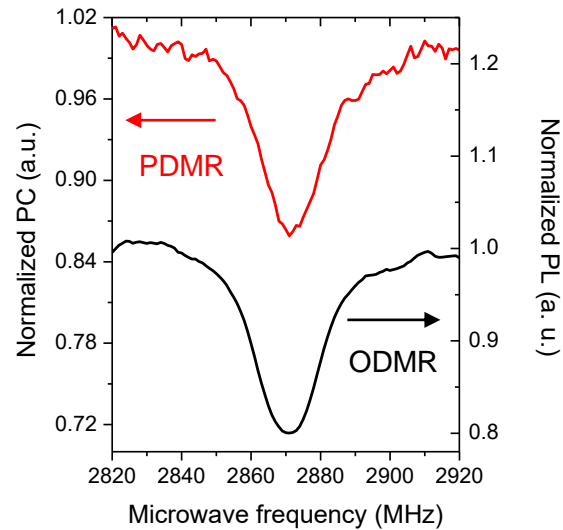
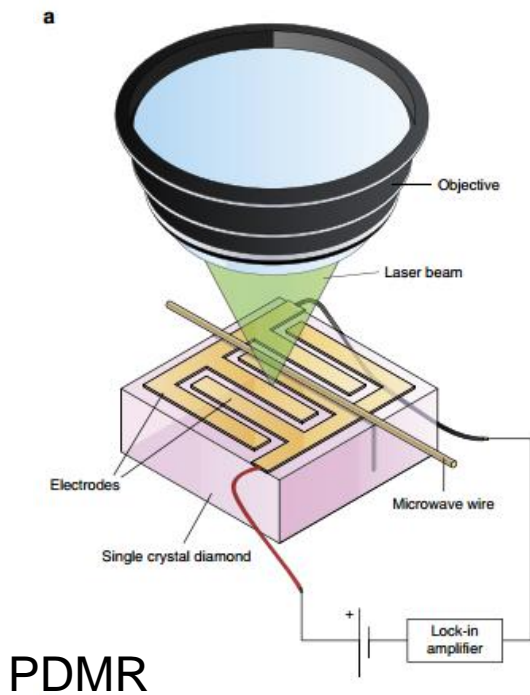
Spinový stav NV⁻ GS

- Optická inicializace do $m_2 = 0$
- MW manipulace
- Optický readout

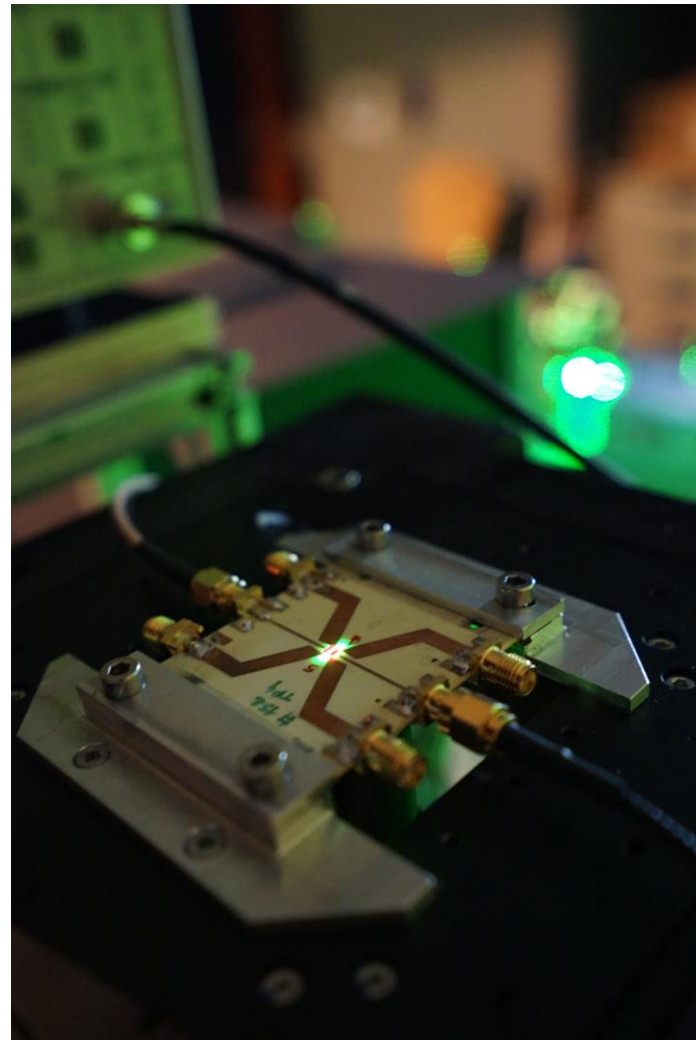
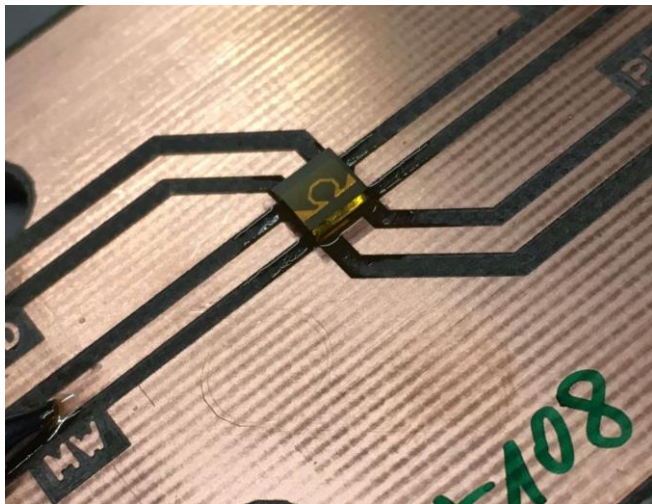
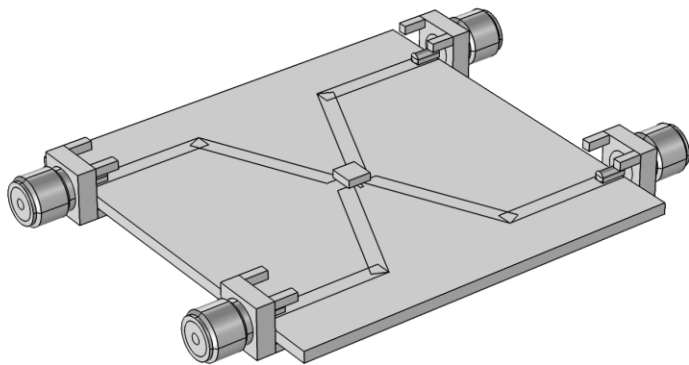
- NV⁻ GS je možné použít jako RT kubit

ODMR vs PDMR

Metody pro měření slabého magnetického pole ~ 10 fT

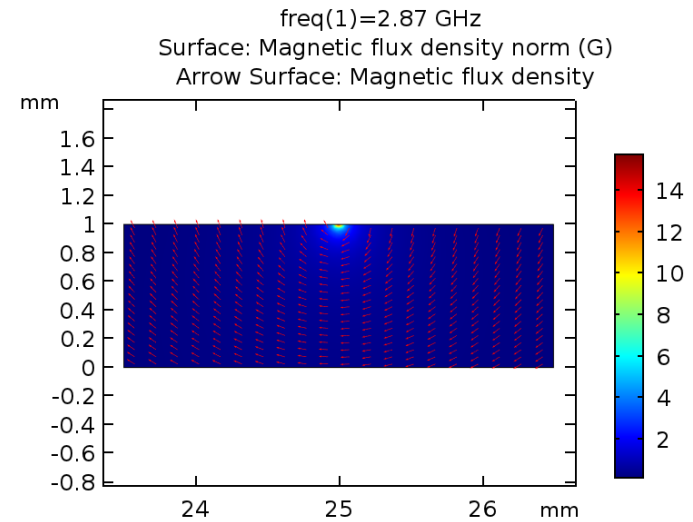
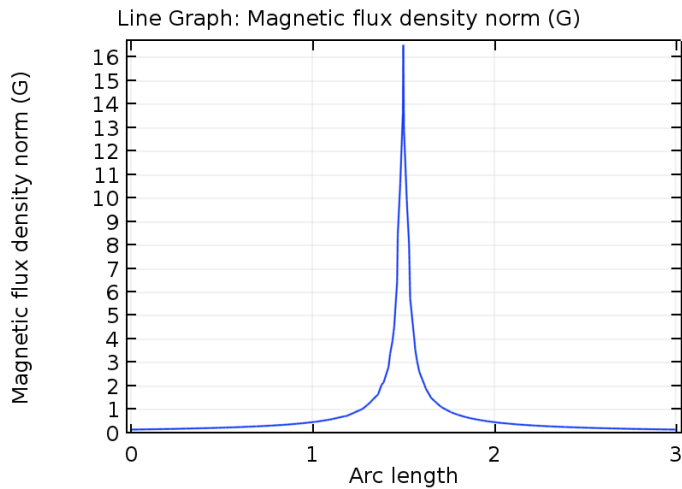
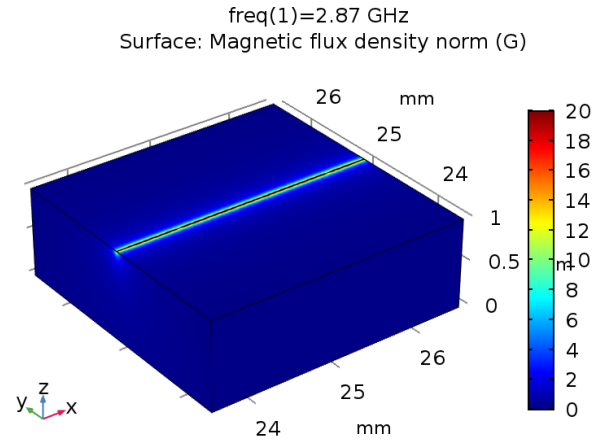
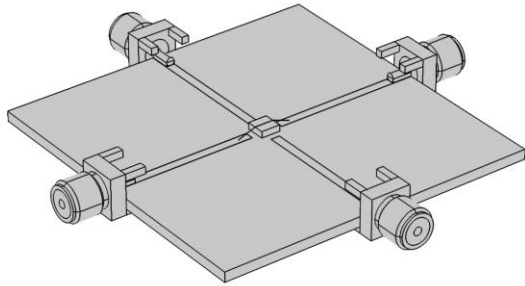


Uspořádání čipu



COMSOL část

Mikrovlnná excitace krystalu



Comsol MatLab bridge

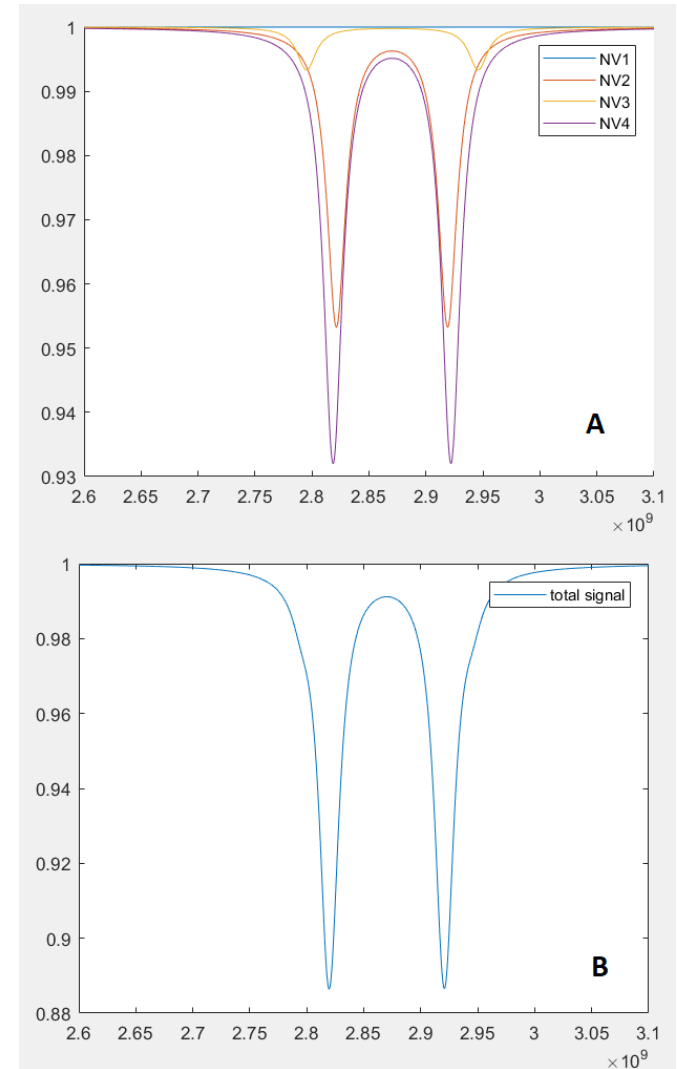
Import vysledku do mtl

1) ground state (electron spin part)

$$H_S = DS_Z^2 + E(S_x^2 - S_y^2) + g_S \mu_B \vec{B} \cdot \vec{S}$$

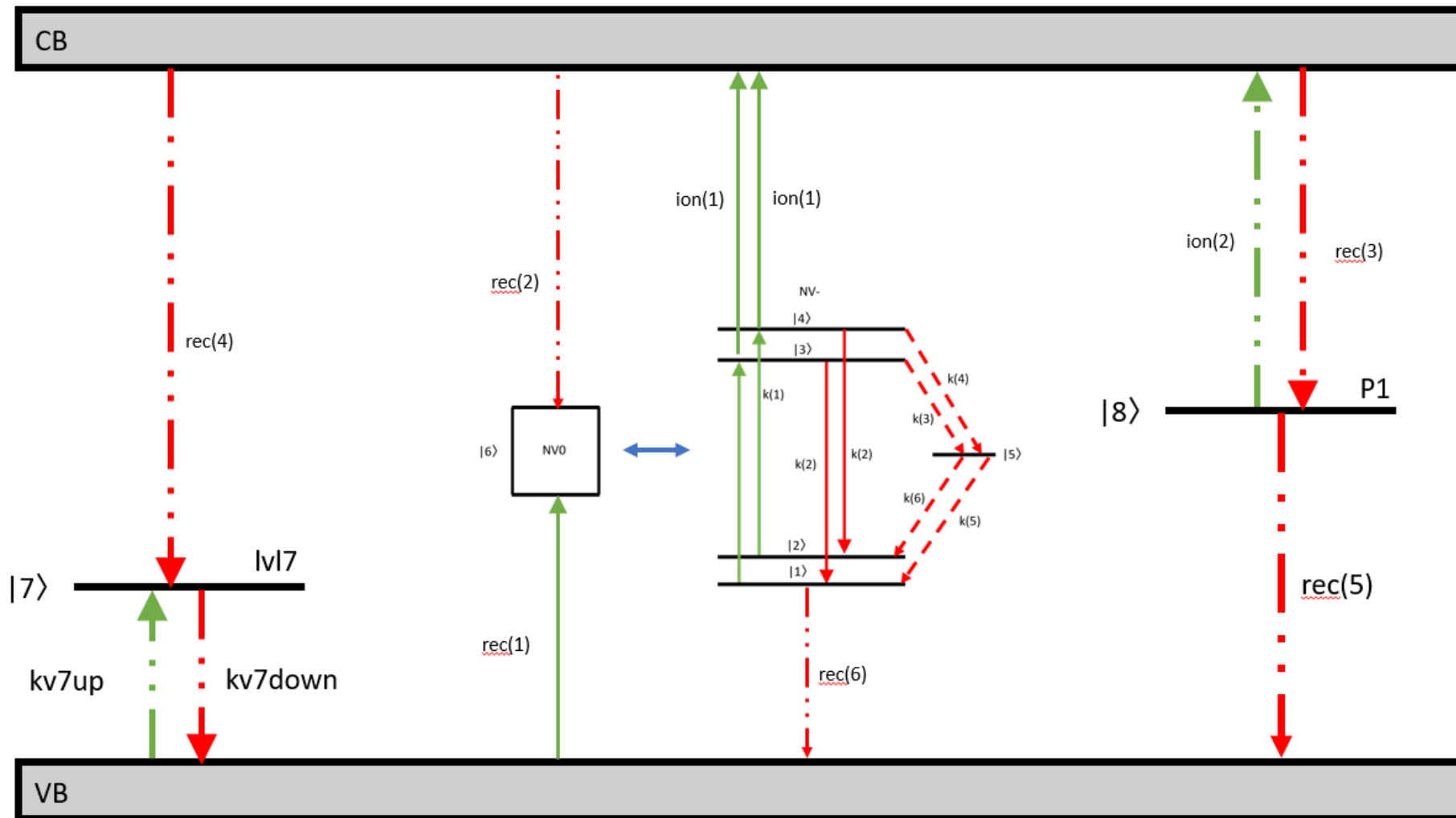
2) Řešení fotodynamiky defektu

$$C_{el}(t) = \frac{I_{el_{MWoff}}(t) - I_{el_{MWon}}(t)}{I_{el_{MWoff}}(t)}$$



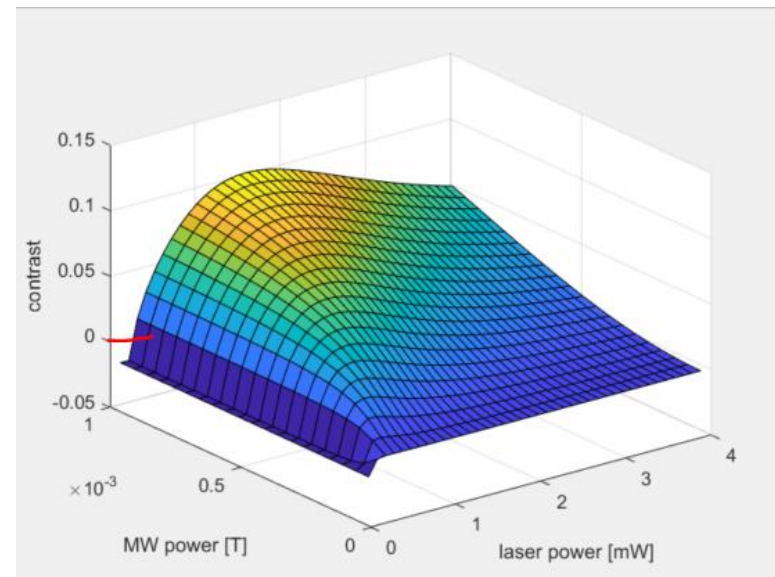
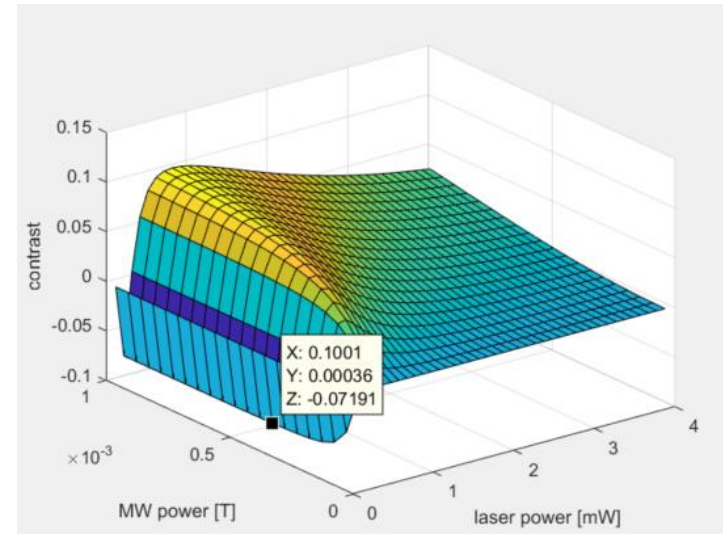
reseni Zeeman split

MatLab část – model fotodynamiky



MatLab část – single defect

- Rešení rate equation pro různou kombinaci defektu
- Teoretický kontrast (PDMR) ve steady-state
- Model simuluje CW měření



Budoucí práce

- Implementovat jevy v CB
- Namodelovat fokusační objem laseru
- Vytvořit řešení na mřížce
- Získat kompletní model kvantového čipu

Děkuji za pozornost

