

Computer control of the NaCs experiment

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October 20, 2014

Without precise timing

- Vapor pressure
- MOT loading
- Objective alignment

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Measurements that require precise timing

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- Temperature calibration
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Without precise timing

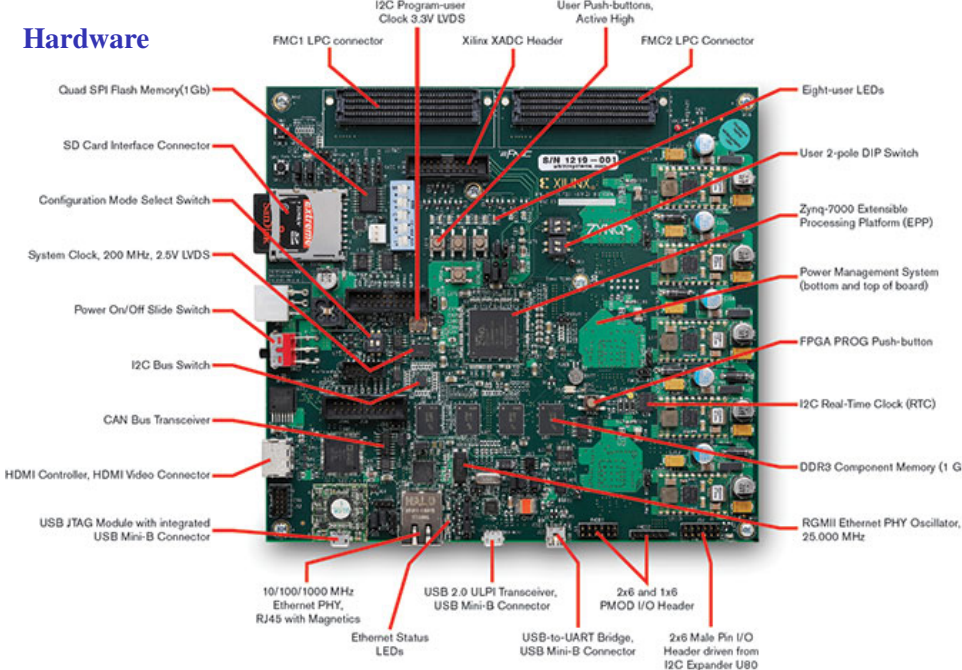
- Vapor pressure
- MOT loading
- Objective alignment

Measurements that require precise timing

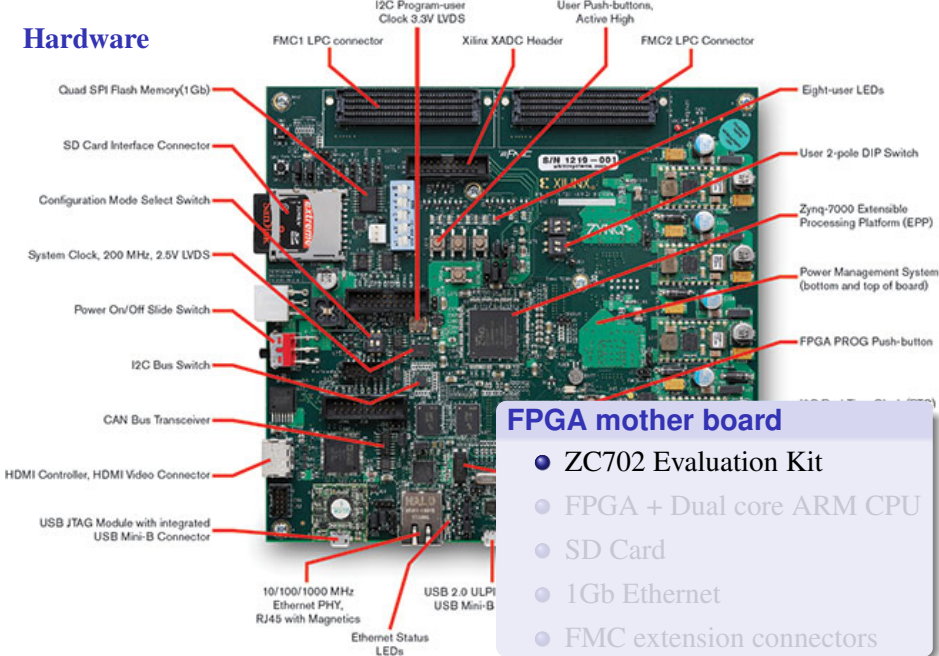
- Polarization gradient cooling
- Temperature calibration
- ODT loading
-

- 1 **Hardware**
- 2 **MOT temperature**
- 3 **Looking for single atom in the ODT**

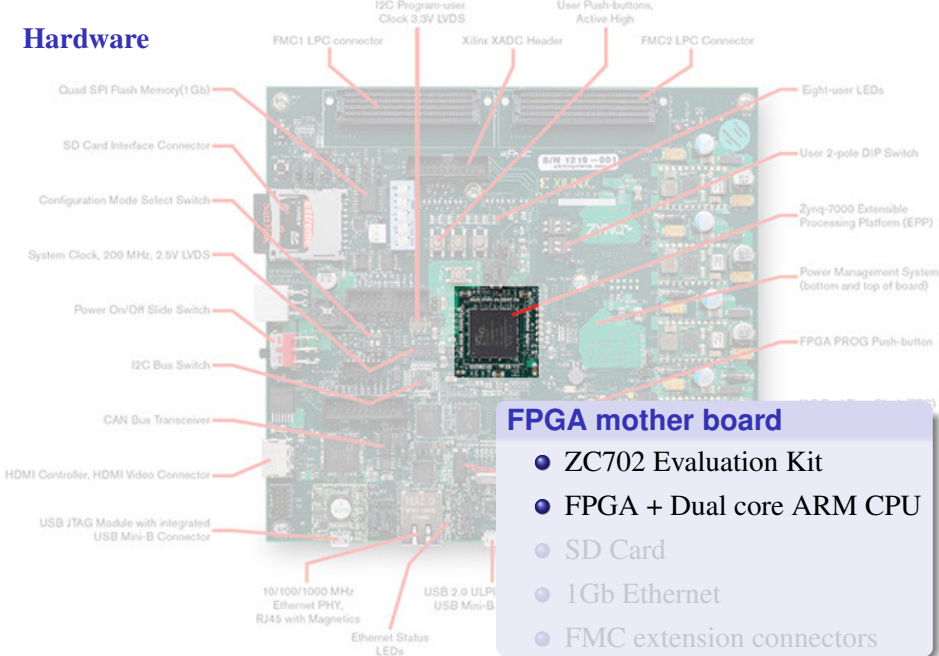
Hardware



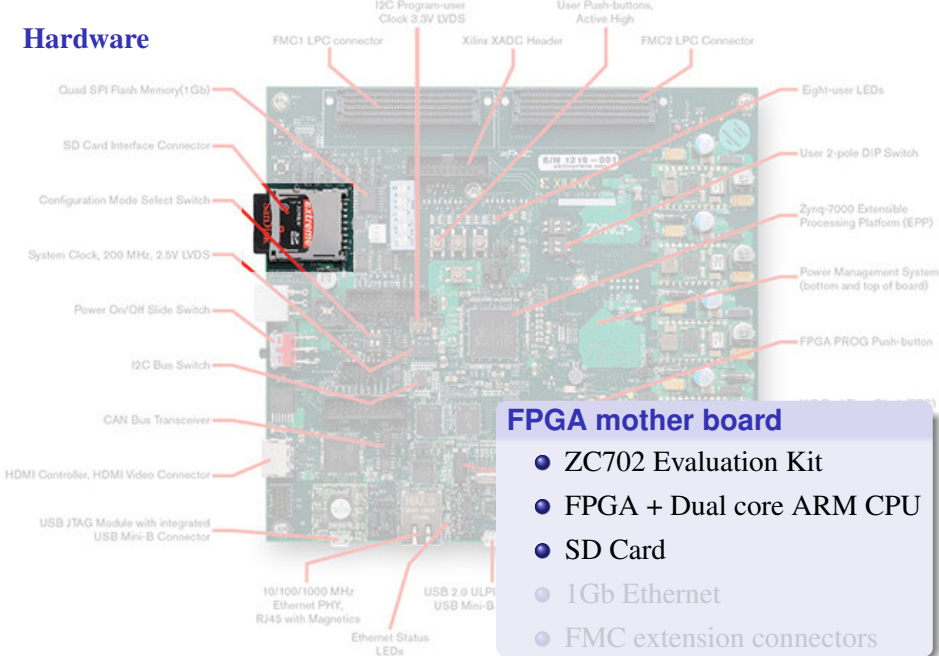
Hardware



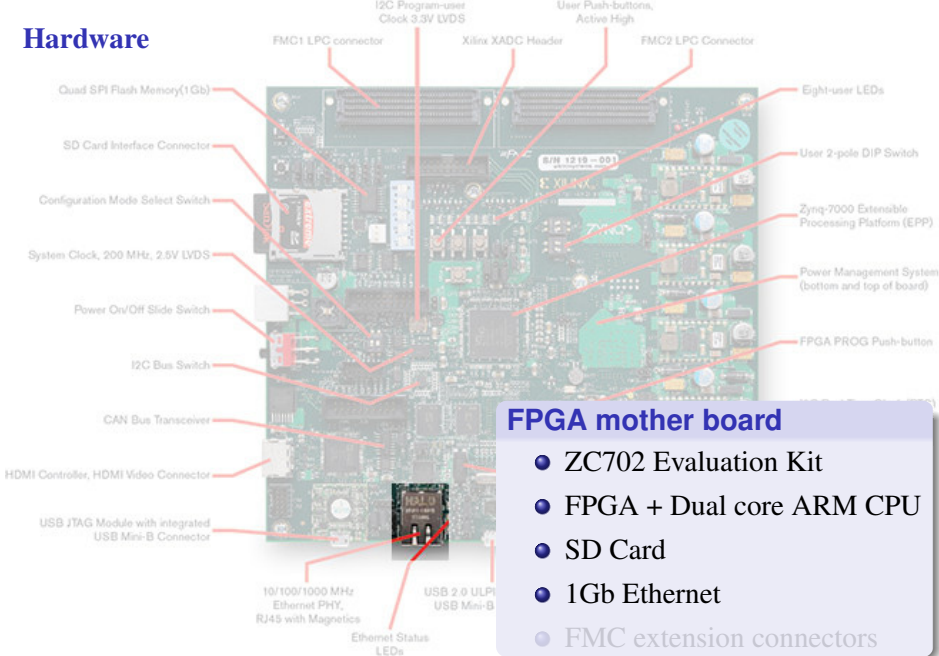
Hardware



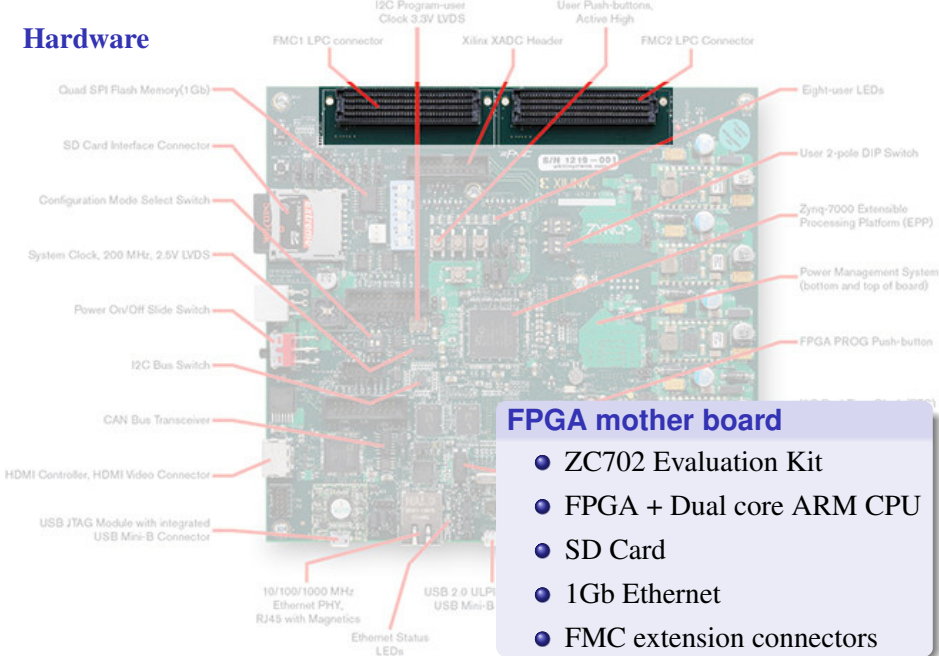
Hardware



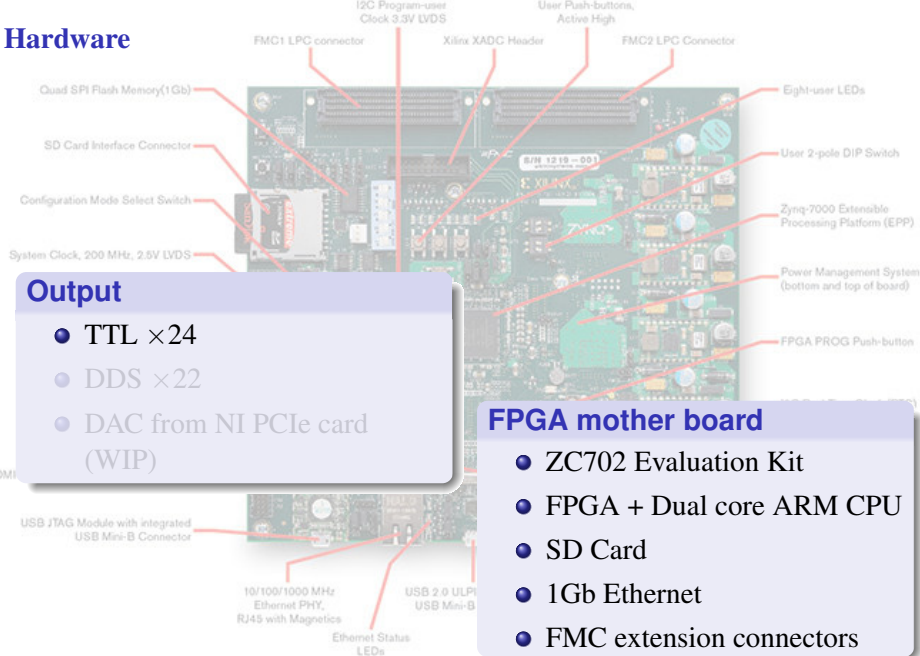
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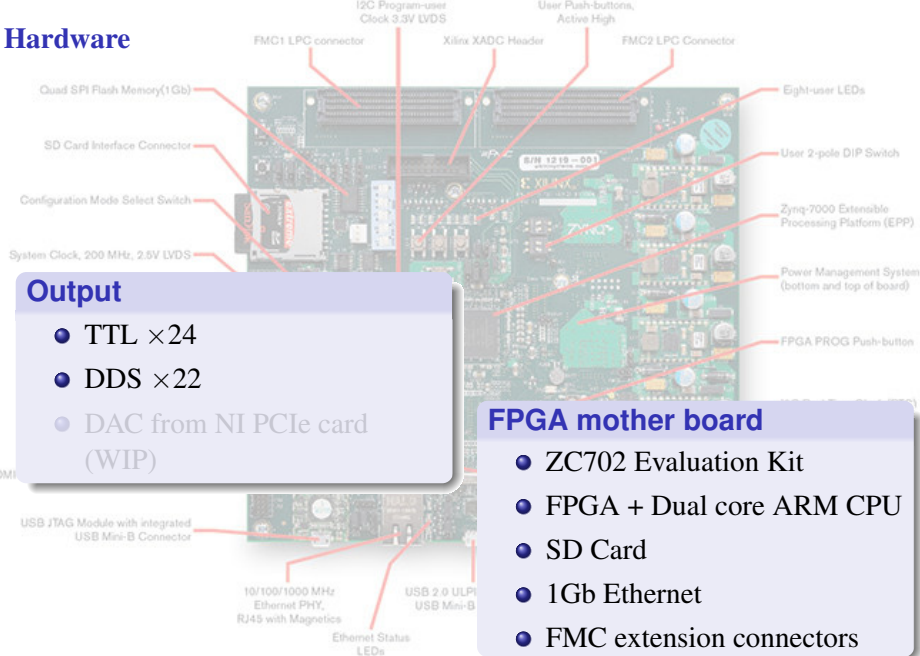
Hardware



Hardware



Hardware



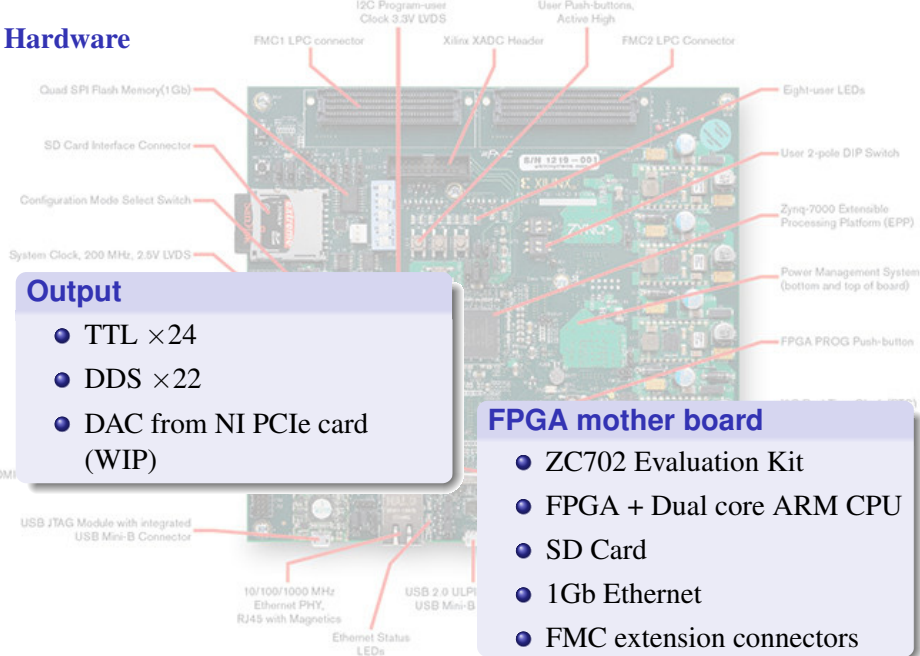
Output

- TTL $\times 24$
- DDS $\times 22$
- DAC from NI PCIe card (WIP)

FPGA mother board

- ZC702 Evaluation Kit
- FPGA + Dual core ARM CPU
- SD Card
- 1Gb Ethernet
- FMC extension connectors

Hardware



MOT temperature

MOT temperature

```
#Enter pulse sequence here  
#TTL 21 is camera  
#TTL 22 is B field  
#amp16 is Cs MOT RP (max. 0.3, use 0.1 for MOT)  
#amp18 is Cs MOT (max. 0.3, use 0.1 for MOT)
```

```
dt = 10 us, TTL(a11) = 0  
dt = 10 us, amp(16) = 0  
dt = 10 us, amp(18) = 0
```

```
#load MOT 10s  
dt = 1 us, amp(16) = .1  
dt = 1 us, amp(18) = .1  
dt = 10000000 us, TTL(22) = 1
```

```
#trig camera for 50 us, wait 300ms  
dt = 50 us, TTL(21) = 1  
dt = 300000 us, TTL(21) = 0
```

```
#flash MOT off for a dt = 3ms  
dt = 1 us, TTL(22) = 0  
dt = 1 us, amp(16) = 0  
dt = 3000 us, amp(18) = 0
```

```
#flash MOT back on  
dt = 1 us, TTL(22) = 1  
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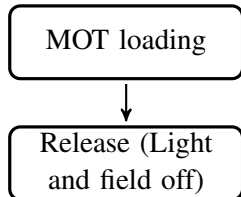
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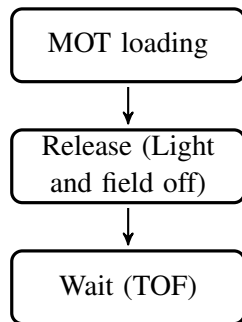
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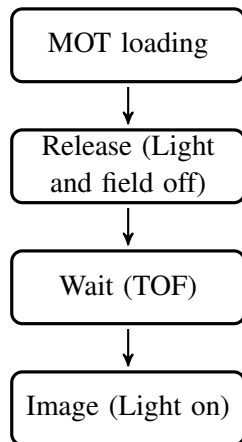
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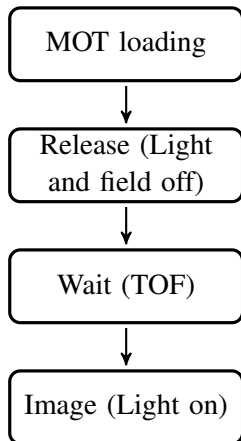


MOT temperature

Cesium MOT temperature

- $TOF \approx 3\text{ms}$

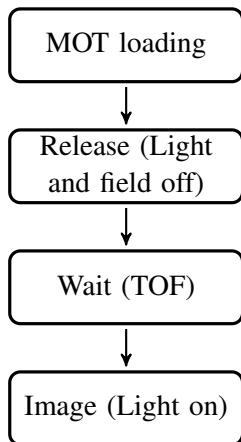
- $T \approx 1\text{mK}$



MOT temperature

Cesium MOT temperature

- $TOF \approx 3\text{ms}$
- $T \approx 1\text{mK}$



Looking for single atom in the ODT

- Looking for single atom in the video
- Background fluctuation
- Background subtraction and averaging
- Release MOT (WIP?)

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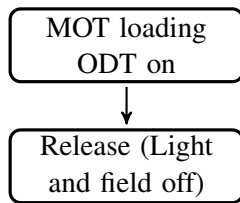
Looking for single atom in the ODT

MOT loading
ODT on

- Looking for single atom in the video
- Background fluctuation
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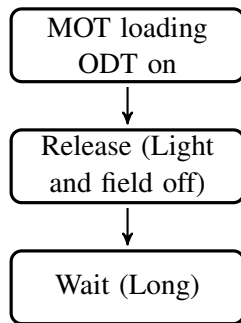
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