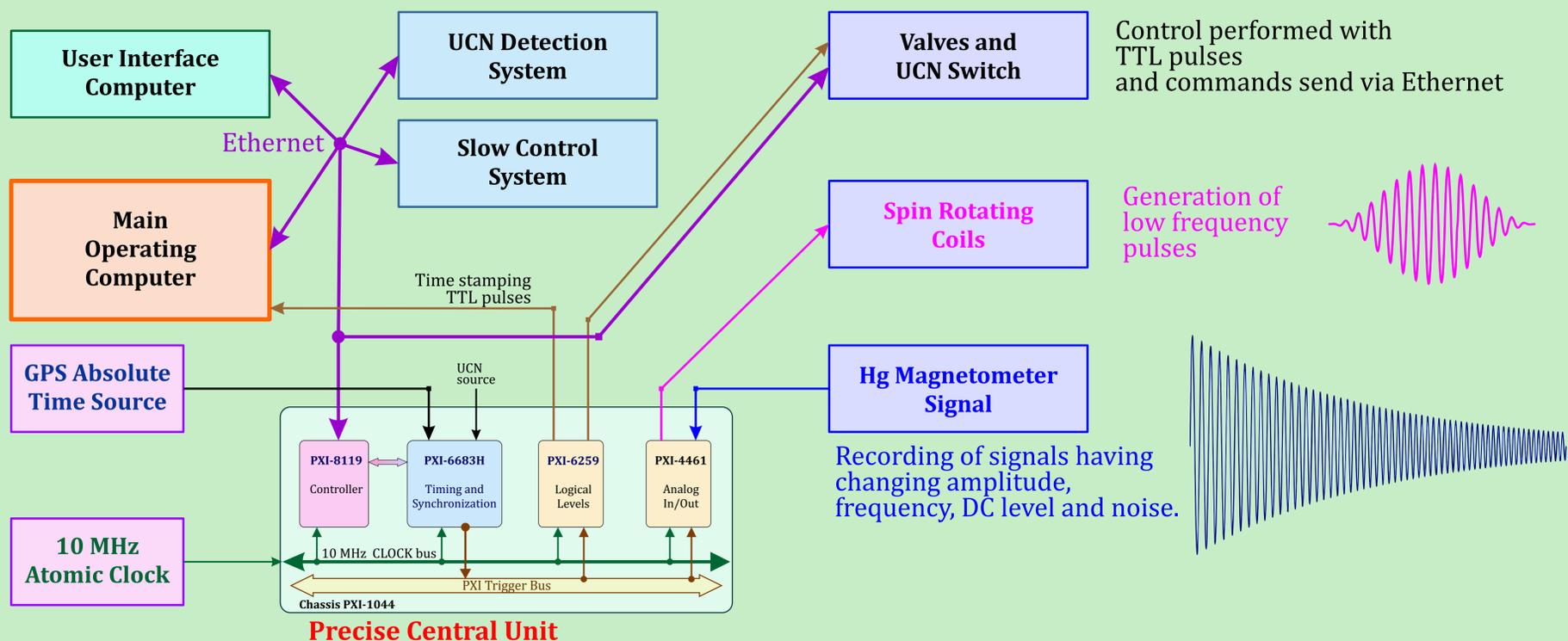


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## General scheme of the DAQ system for the n2EDM experiment at PSI



## Features of the Precise Central Unit modules

PXI-8119  
Controller

Controller communicates with other systems, defines triggers for other PXI modules, performs digital filtering of the Hg-magnetometer signal and calculates waveforms generated for spin rotating coils.

PXI-6683H  
Timing and Synchronization

Timing and synchronization module is the main timer of the system. It synchronizes to the frequency of the atomic clock, while it receives the time from the GPS satellite signal. It waits for TTL signals from the UCN Source, and according to the cycle schedule this module triggers other modules via the PXI Trigger Bus.

PXI-6259  
Logical Levels

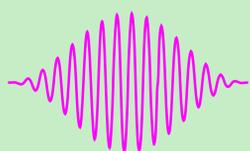
Multifunction DAQ module is equipped with both digital and analogue inputs and outputs. It can send logical TTL levels for triggering of other devices and time stamping of measurement steps. Settings of logical outputs are triggered by the synchronization module via **PXI Trigger Bus**.

Inaccuracy of time distance between generated TTL pulses is unmeasurable, which means that it has a time accuracy of the atomic clock. The delay of generated pulses with respect to the trigger is less than 20 ns and can be compensated for.

PXI-4461  
Analog In/Out

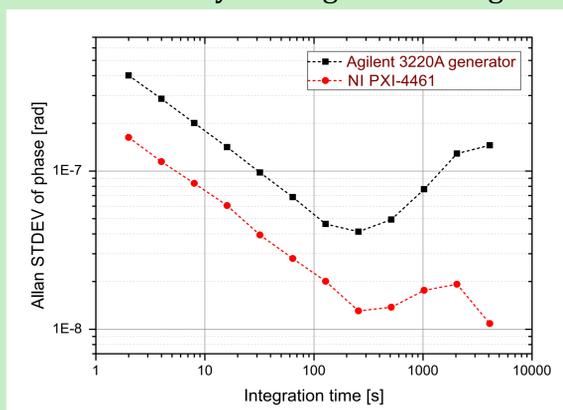
Dynamic Signal Analyzer consists of two analog inputs and two analog outputs. They base on high-quality, 24-bits, sigma-delta AD and DA converters. This module is used to record signal(s) coming from the mercury co-magnetometer and to generate oscillating pulses for Hg and neutron spin rotation. Start moments of reading and generating signals are triggered by the synchronization module via **PXI Trigger Bus**.

Spin-flip signal envelope



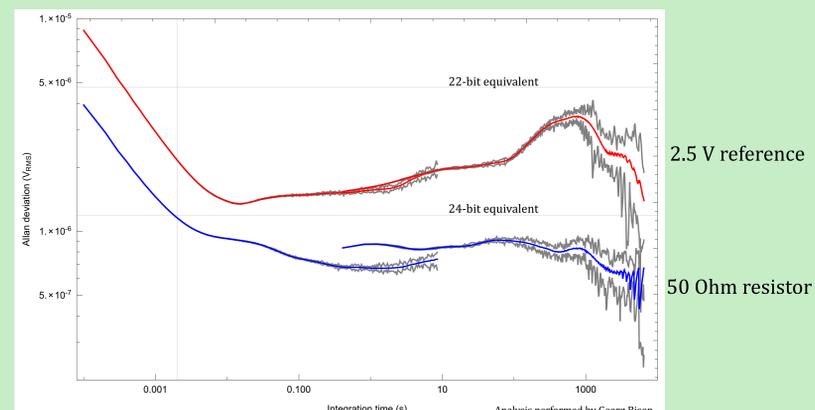
Properly chosen envelope of the generated signal eliminates statistical loss and systematic effects.

Phase stability of the generated signal



Phase stability needed for the n2EDM@PSI experiment is  $2e-6$  in 200s measurement. Here we have better than  $2e-8$ .

ADC noise



The 24-bit sigma-delta analog-to-digital converters reach  $1\mu\text{V}/10\text{V}$  noise after 2ms averaging. Thus we have 24 bit resolution with 500Hz bandwidth in order to sample the 8Hz signal of the Hg co-magnetometer.

The tested PXI system can perfectly service the n2EDM@PSI experiment.