

Frequency stabilisation of high power RF resonators for pulsed positron beams

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To investigate inhomogeneous defect distribution by positron annihilation lifetime spectroscopy a pulsed and focused positron beam is needed. For this purpose the Scanning Positron Microscope (SPM) was built and operated by the Universität der Bundeswehr München [1]. To overcome the limitation of low count-rates obtainable with a laboratory source the SPM is currently transferred to the intense positron source NEPOMUC at the MLZ in Garching [2].

To convert the continuous NEPOMUC beam into a pulsed beam of high brightness a special interface was built [3]. A sophisticated beam preparation is needed to reach a lateral resolution in the micro-meter range. An essential component of the interface is the positron elevator which compensates for the energy loss caused by the remoderation process without altering other important beam properties [4, 5].

The bunching system of the interface works at 50 MHz. This is also the resonance frequency of the resonator. The resonator provides a 10 kV sine-wave at an electrical power of 80 W for the positron elevator. To ensure proper operation of the whole system, stable amplitude, stable frequency and stable phase of the RF-signal are crucial. This is achieved by a newly developed feedback controller.

In this contribution we will give an overview of the complete device with a focus on the frequency stabilization system of the positron elevator, shown in Fig. 1.

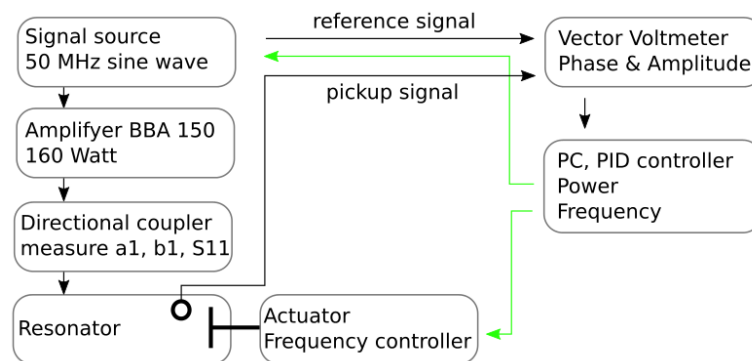


Figure 1 Circuit diagram of the electrical components of the positron elevator.

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