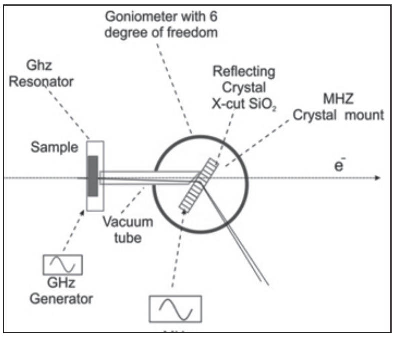
In the present work details of experimental investigations of X-ray transition radiation from the periodical permittivity structure are discussed. It is shown the possibility of Creation of a new generation of coherent x-ray sources according the scheme presented in the Figure below.

This phenomenon is observed for electrons of 20 MeV energy. For the electrons source we used the LEA-50 linac of the Yerevan Physics Institute [2]. The beam parameters are: current of the electron beam is 0.1 mcA, the energy resolution is $\pm$30 KeV, the vertical aperture is 0.0005 angular radian, the horizontal aperture is 0.01 angular radian. As a sample of investigations amorphous quartz with different thickness was taken. The acoustic field in the sample was excited by a specially designed system of high Q resonators. The emitted transition radiation and electron beam passes trough vacuum tube. For separation of the produced transition radiation from electron beam, additionally X-cut quartz crystal was placed after the amorphous quartz sample. The crystal was placed in the specially designed MHz mount and has satisfied full pumping condition for transition radiation [3-4]. The separated transition radiation passes trough vacuum tube and can be used as a coherent x-ray source.

The detailed analysis of experimental data shows that the peak of intensity depends on amorphous quartz purity, frequency and amplitude of the excited hyper frequency acoustic fields.

Results of investigation shows:

- The intensity of radiation may be varied by changing the value of hyper frequency electromagnetic field amplitude.
- The registered value of ratio N_γ/N_e is very large from expected and depends on target quality.
- The intensity of the radiation depends of $\Delta\omega_s$ ()i.e. boundary layers of plots by $\Delta\omega_s$.
- The analysis of numerous experiments results shows that the ratio value varies in the range > 1.
- For the targets of different summary thickness the intensity has no changes, i.e. only last layers have contributing in intensity.



According to the developed theory [1] the estimation of measured parameters has been in good agreement.

Let us note also that as a source of monochromatic x-ray radiation it can be used PXR when the crystal is excited by acoustic field.

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Pair of canted undulator MX beamlines proposed for NSLS-II

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We describe a concept for x-ray optics to feed a pair of macromolecular crystallography (MX) beamlines which view canted undulator radiation sources in the same storage ring straight section. This has been proposed for the National Synchrotron Light Source –II (NSLS-II) and can be deployed at other low-emittance third-generation synchrotron radiation sources where canted undulators are permitted.

The concept adopts the beam-separation principles employed at the 23-ID (GM/CA-CAT) beamlines at the Advanced Photon Source, wherein tandem horizontally-deflecting mirrors separate one undulator beam from the other, following a double-crystal monochromator. The scheme described here would deliver the two tunable monochromatic undulator beams to separate endstations that address different and somewhat complementary purposes, with further beam conditioning imposed as required. A downstream microfocusing beamline would employ dual stage focusing for work at the micron scale and, unique to this design, switch to single stage focusing for larger beams. By contrast, the upstream beamline would only employ single stage focusing with variable focal length.

The final x-ray hutch in the downstream position would be relatively long (>~15 m), designed to accommodate a flexible secondary microfocusing optics system. This would include an adjustable secondary source aperture toward the upstream end of the hutch, and then microfocusing mirrors or lenses positioned just before the focus point at the experiment. When one requires the minimum beam size (~1 µm or less), two-stage horizontal focusing can be pursued by adjusting the curved figure of one of the upstream horizontally-deflecting mirrors to focus the beam at the secondary source aperture. The subsequent microfocusing optics would then re-focus the beam diverging from there. When a larger beam size (10-20 µm or greater instead of 1 µm) having less horizontal divergence (0.1 µrad instead of 1 µrad) is preferred, the microfocusing optics stage can be bypassed and the focal length of the upstream mirror can be adjusted accordingly.

A challenge that will be addressed in this beamline will be the manipulation of samples to take advantage of a 1 µm beam.

The other beamline, located upstream and with a somewhat shorter x-ray hutch (<~10 m), would contain a more conventional beam focusing optics system (demagnifying Kirkpatrick-Baez [K-B] mirror system) that would be permanently deployed. To employ the beam effectively, even with space restrictions in this experimental hutch owed to the presence of a beam tube passing through it to deliver a beam to the downstream beamline, we plan that the operation of this beamline will be highly automated with a minimum of manual access needed.

On this beamline, it is intended that the K-B mirrors can rapidly adjust their focal lengths to tailor the beam properties according to experimental requirements.

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Multilayer optics for novel sources In X-ray analytics

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