Development of Neutral Beam Injection System for KSTAR Tokamak

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Abstract

The design results and the developmental status of the KSTAR NBI system are described. The KSTAR Neutral Beam system shall provide ion heating, current drive, core fueling, profile controls for pressure and current by injecting energetic neutral particle beam, and support diagnostic requirements. The facility shall initially be configured to provide 8 MW of deuterium neutral beam power to the plasma per beam line. It can be achieved by a modification of one TFTR beam line with 300-s pulse lengths. The facility shall be capable of accommodating 14 MW of deuterium neutral beam power to the plasma (one co-directed TFTR beam lines plus one counter-directed TFTR beam line modified for 300-s pulse lengths). The beam line shall be oriented with a tangency radius for the central beam trajectory of 1.486 m. The beams shall inject at fixed angular positions.

A Study on Nuclear Specific Material Detection Technique Using Nuclear Resonance Reactions

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Abstract

The non-destructive nuclear material detection technique is one of the novel methods under somewhat dangerous environments, for example, high level radiation or landmine areas. Specially, the detection of a landmine is a hot issue on the peaceful use of nuclear technology for human welfare. Generally, the explosives contain specific elements such as ^{14}N or ^{35}Cl. The photo-nuclear resonance gamma-rays are produced by nuclear reactions $^{13}C(p, \gamma)^{14}N$ or $^{34}S(p, \gamma)^{35}Cl$ in which target is bombarded by about 2MeV proton beam extracted from the proton accelerator. To avoid other neighboring resonant gamma-rays, we selected a higher resonant energy above 5MeV. The resonance gamma rays produced are absorbed or scattered when they react with ^{14}N or ^{35}Cl included in the mines and explosives. We can determine existence and position of mines or explosives by detecting the absorption and scattering gamma-ray signals.