

# Beam Emission Spectroscopy (BES)

T. Kobayashi, M. Yoshinuma, W. Hu, and K. Ida

*e-mail: kobayashi.tatsuya@nifs.ac.jp*

## 1. Purpose / Application

A new beam emission spectroscopy (BES) system that has improved lines of sight is installed in LHD, and routine measurement has been started in the 21st LHD experiment campaign in 2019–2020. The new system is optimized for hydrogen isotope experiments by equipping a rotatable large-diameter interference filter to be compatible with either the hydrogen or the deuterium beam emission component [1]. An avalanche photo diode detector array having  $8 \times 8$  pixels is used for obtaining a radial-vertical image of electron density fluctuation covering the mid-radius to the plasma periphery [2].

## 2. Name of analysis (Kaiseki) data / module of MyView2

Kaiseki data: lhdbesapd3\_raw (raw data of all 64 channel), lhdbesapd3\_LP1kHz (slowly varying component of raw data of all 64 channel), lhdbesapd3\_psd (radial profile of power spectral density)

MyView2: lhdbesapd3\_LP1kHz, lhdbesapd3\_psd

## 3. General Description (Port, field line, time resolution, spatial resolution, number of channels, etc.)

System overview: see figure 1 below

Installed port: 6-O

Line of sight: see figure 2 below

Sampling time: 200 kHz

Bandwidth of amplifier: 100 kHz

Spatial (radial) resolution: 1.5-5 cm

Wavenumber resolution:  $k_{\perp} < 1 \text{ cm}^{-1}$ ,  $k_{\perp} \rho_i < 0.2$

Number of channels: 8x8 (radial-vertical array)

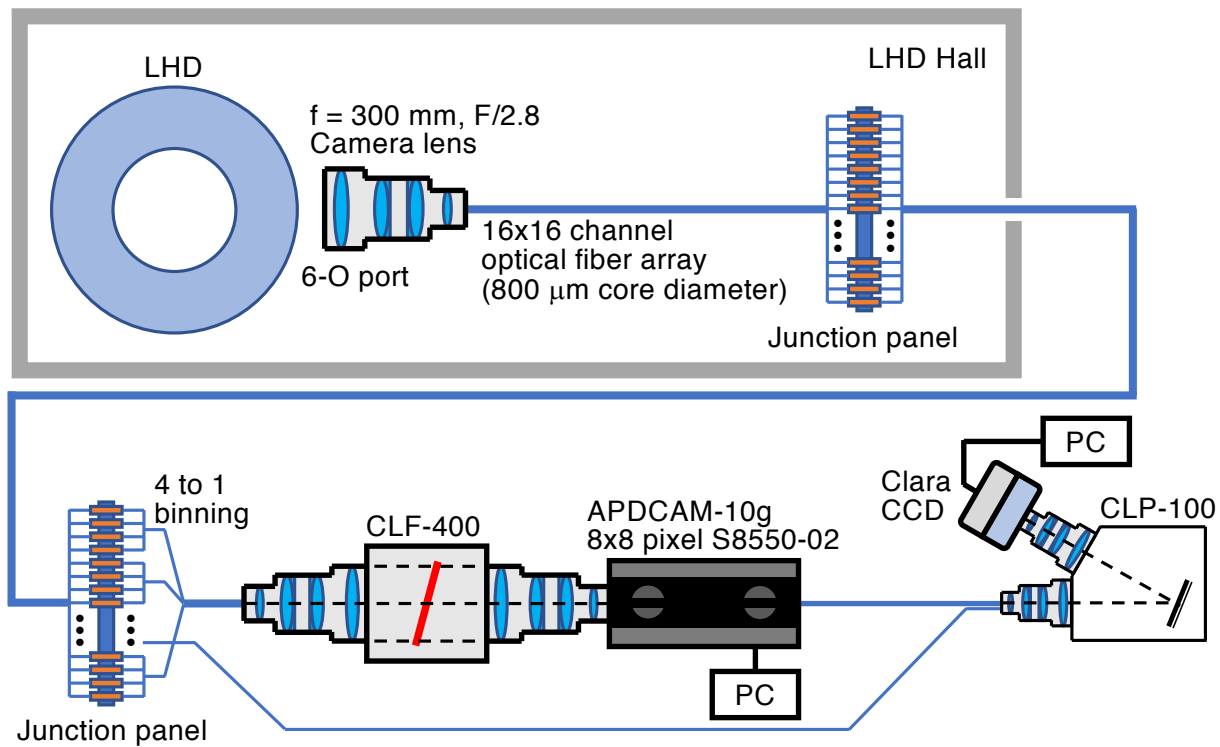


Figure 1. System overview of BES in LHD [2].

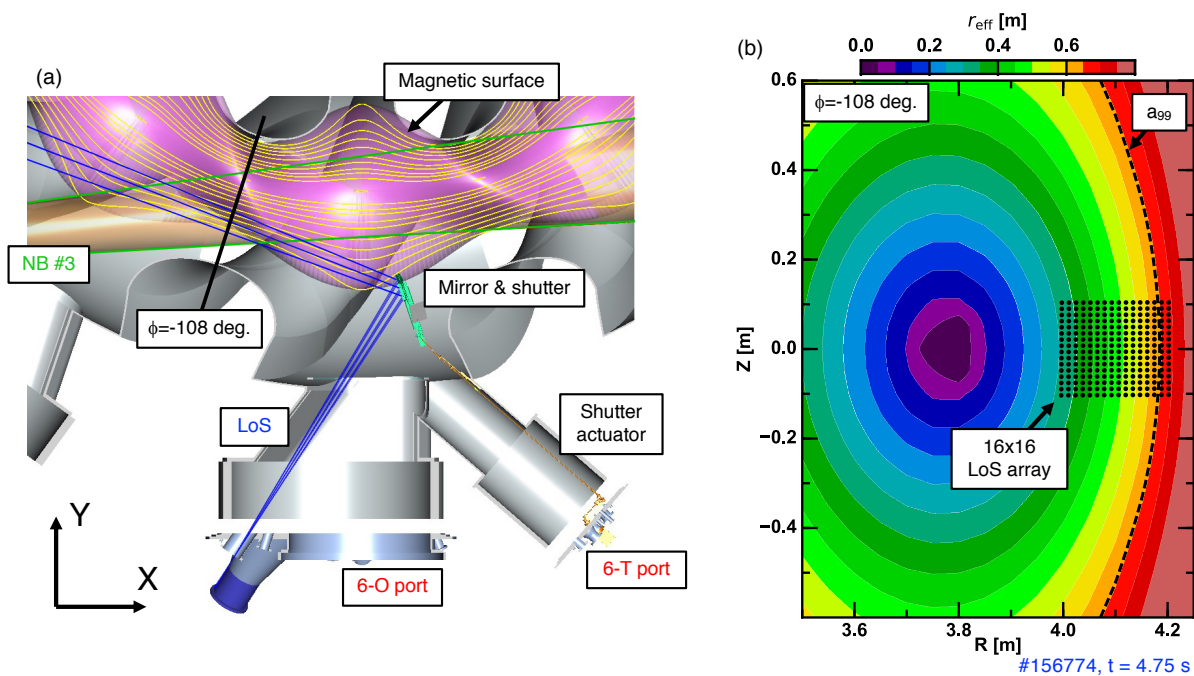


Figure 2. Schematic of BES in LHD [2].

#### **4. Requirement in use**

NBI # 3 is the probe beam.

#### **5. Description of analysis (Kaiseki) data / module of MyView2**

Kaiseki data: lhdbesapd3\_raw (raw data of all 64 channel), lhdbesapd3\_LP1kHz (slowly varying component of raw data of all 64 channel), lhdbesapd3\_psd (radial profile of power spectral density)

MyView2: lhdbesapd3\_LP1kHz, lhdbesapd3\_psd

#### **6. Others**

#### **References**

- [1] V. Olevskaia, T. Kobayashi, K. Ida, M. Yoshinuma, and W. Hu, Plasma Fusion Res. **14**, 1305118 (2019)
- [2] T. Kobayashi, M. Yoshinuma, and K. Ida, submitted to Plasma Phys. Control. Fusion (2020)