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## 8.31 A Divertor Scraper Observation System for Wendelstein 7-X

Tuesday, 17 April 2018 16:01 (120)

A graphite element, called a scraper [1], will be installed in 2018 on the Wendelstein 7-X stellarator in the throat of the divertor (at two out of ten potential toroidal locations). We have designed, built, and calibrated a new infrared/visible imaging endoscope system to enable detailed observations of the plasma interactions and heat loads at one of the scrapers, and the neighboring divertor surfaces. The new endoscope uses a shuttered, pinhole-protected, pair of 90° off-axis 218 mm focal length aluminum parabolic mirrors in vacuum, and two flat turning metal mirrors, to send light to a sapphire window 1.4 meters away, beyond which we have co-located telephoto lens-based mid-infrared and visible cameras. The camera field of view covers the entire 650 mm length of the scraper, and includes locations monitored by thermocouples and Langmuir probes embedded in some of the scraper tiles. Detailed design, assembly tests, installation, and comparison of predicted (ZEMAX) and actual optical test performance will be discussed.

[1] A. Lumsdaine, et al., IEEE Transactions on Plasma Science (Volume: 44, Issue: 9, pg. 1738-1744, Sept. 2016 )

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