

Dear NSTX researcher,

The Kodak fast framing camera (model EktaPro EM1012) used at NSTX since Day 0, most commonly known as “**the Los Alamos camera**”, is getting old. By the end of the past run period, due to its use at NSTX, Alcator C-Mod, and TFTR, it had run for more than 2.7 times its expected operational life as measured by effective exposures on the intensifier. Sooner or later it will need to be replaced.

For the past two years we have proposed to get a new fast framing camera such as a Kodak EktaPro HS4540. Such an upgrade (see comparison table on back) will result in two big benefits:

1. Faster frame rate and shorter exposures will allow for **better research**. Examples are: follow edge turbulence changes when going in and out of H-mode (Gas Puff Imaging diagnostic), study MHD perturbations of plasma edge, obtain several (partial) images during IRE process.
2. Present camera (EM1012) can be used for operations while new camera is free for physics uses ...at least until the operational life really runs out! And, in some situations we could use two fast views of the same phenomena, like “side-on” and “end-on” views of the edge turbulence.

We hope we can be proactive in this matter and not wait until the EM1012 intensifier dies to get a new camera. Otherwise we will have a down period of at least a couple months until the new system becomes operational. A few statistics:

- a) Seven of the eight XPs executed during the past run period had the fast camera as a **required diagnostic**. The only XP that didn't required it (XP-09) argued that “*it is not required because it is always operational*” (or something of this sort), it was then only “desired”. The fast camera is also the leading diagnostic for XP-10 (Edge Turbulence Measurements).
- b) During the past run period the Los Alamos fast camera was **operational** for over **95% of the plasma shots**, starting on the very first plasma. In most of these shots, if not all of them, the physics operator and/or session leader looked at the fast camera diagnostic. The fast camera data, in the form of slow video playback, was available within seconds of the plasma end ...even before magnetics!

Certainly, the upgrade to the new camera is a considerable one-time investment, but if one assumes that the system will be available for at least 10 years, as the current EM1012 system has been, it represents only a moderate yearly amount.

We need to have this upgrade included in a prioritized list of allocations. Please, **share your thoughts**. Thank you.

Sincerely,

Ricky Maqueda
NSTX researcher from LANL
maqueda@lanl.gov

Camera system	EktaPro EM1012	EktaPro HS4540
Frame rate (full frame)	1000 Hz	4500 Hz
Maximum frame rate (partial frame)	6000 Hz	40500 Hz
Resolution (full frame)	239 x 192 pixels	256 x 256 pixels
Dynamic range of detector	8 bit	8 bit
Minimum exposure	10 μ s	20 ns
Frame storage	1638 full frames	5120 full frames
Spectral range	440-700 nm	180-850 nm
Status	getting old (then, \$140k)	proposed upgrade (~\$280k)

Note: Any fast-framing, intensified digital camera with improved characteristics will be considered.