

## IN BRIEF

This volume of the LLE Review, covering the period January–March 1990, contains a study of electron heat transport using two-dimensional Fokker-Planck simulations and an article describing how plastic microshells are being manufactured at LLE for future implosion studies. The advanced technology section reports on an experiment that has measured exponential gain in a number of x-ray lasing transitions and discusses the continuing development of a two-dimensional high-speed electro-optic probing system. Finally, the activities of the National Laser Users Facility and the GDL and OMEGA laser facilities are summarized.

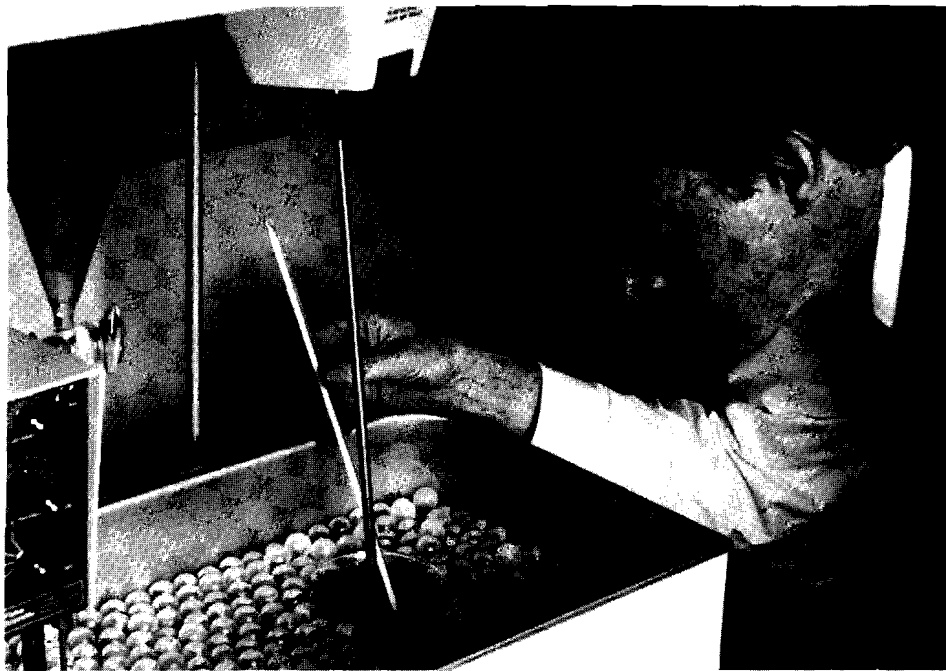
The highlights of this issue are

- The validity of fluid models of electron transport has been investigated in the context of laser fusion. Comparisons with numerical solutions of the electron Fokker-Planck equation confirm the existence of flux inhibition for  $(Z + 1)^{1/2} \lambda_e > 0.005 l$ , where  $\lambda_e$  is the scattering mean free path of a thermal electron and  $l$  is the appropriate temperature scale length. When compared with fluid predictions, two-dimensional Fokker-Planck simulations of heat transport under nonuniform laser illumination show reduced smoothing in the corona and enhanced smoothing at the ablation surface.

- Large numbers of polystyrene microshells have been produced using the microencapsulation technique. The resultant shells have very uniform wall thickness, a smooth surface finish, and few, if any, vacuoles embedded in the wall. In an adaptation of the process, the number of shells lost due to cracking has been significantly reduced by using osmotic action to remove water from the interior of the shells.
- X-ray laser experiments on the single-beam GDL laser have demonstrated gain in several elements using slab targets. Collisionally pumped Ne-like Ge was observed to lase on five  $3s-3p$  transitions in the range 196 Å–287 Å. Other experiments showed lasing on the  $3d-5f$  and  $3d-4f$  transitions in Li-like Al (105 Å and 154 Å). This scheme was extended to produce gain in Ti at 47 Å. Additionally, a new lasing transition has been demonstrated in the Ti targets at a wavelength of 326.5 Å. It is speculated that this is a  $3s-3p$  transition in Ne-like Ti and may be pumped by mechanisms other than collisions.
- A two-dimensional time-resolved electro-optic probe has been developed and used to measure surface-field collapse in a number of photoconductive switches with 200-ps time resolution and 3- $\mu\text{m}$  spatial resolution. The switching speed and generation of field enhancements in a GaAs bulk switch were found to be dependent on the illumination configuration and the applied field. Switching efficiency was found to decrease with increasing field.

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Stephen Noyes, Senior Technical Associate, is shown monitoring solution temperature during production of polystyrene shells made by the microencapsulation process. Highly uniform polymer shells necessary for high-density implosions are produced by this method.