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BROOKHAVEN NATIONAL LABORATORY

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Upton, L.I., N.Y.

PHYSICS DEPARTMENT

Informal Report

A NON-DISTORTING FILM CLAMP FOR THE MARK II HPD PLATEN

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NOTICE

A Non-Distorting Film Clamp for the Mark II HPD Platen

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For several months experimenters have known that average beam momenta for a roll of film measured with the Mark II HPD exhibit systematic shifts of up to a few percent for momenta greater than 20 GeV/c. Periodic calibration runs with a precision glass grid confirm a small stable curvature corresponding to shifts of a few tenths of a percent. This small curvature is removed from the track-view points when they are transformed from HPD coordinates to cartesian coordinates.

The cause for the systematic shifts has been traced to the original platen clamp for the film.

Seventy mm film is held in place by vacuum and thirty-five mm film is held in place by an optical flat. A plan sketch of the film path with the platen open is shown in Fig. 1. The relevant film pulleys are marked S for sprocketed and U for unsprocketed. Pulleys U1 and U4 provide wrap-around for pulleys S1 and S2. S1 drives a tachometer and a belt for a sprocket-counting digitizer. S2 carries an electric brake. Pulleys U2 and U3 that are attached to the moving platen clamp guide the film for advancement. S1 and S2 position the film vertically. The emulsion faces the HPD prism. The normal shrinkage of the emulsion causes the edges of the film to contact the prism first during the clamping motion. In the original clamping sequence the brake at S2 was applied a few msec. before the clamp started to move.

The precision glass grid was copied onto thirty-five mm bubble chamber film. Three rows of twenty fiducial marks were measured in one sweep per row. A sagitta was computed for each row using a parabolic least squares fit and it was printed on-line. On the twelve cm base sagitti between ten and twenty microns were observed using the original clamp. With the film vacuum column at atmospheric pressure, the sagitti were about two microns which is comparable to the residual curvature of the coordinate system mentioned earlier.

A non-distorting film clamp has been installed. The pulley, U1, has been replaced with a sprocketed pulley attached to an electric brake which is energized at the same time as the brake on S2. As the clamp closes the film between pulleys S1 and S2 becomes slack. The amount of slack is adjusted by the position of the blocks on which S1 and S2 are mounted. Moving them up in Fig. 1 increases the slack. With this arrangement, the smaller (2μ) sagitti are obtained with vacuum in the film columns.

We have concluded that the film suffered small displacements in the vertical plane during final moments of the original clamping sequence. We believe that this motion is still present, but of negligible consequence due to the slack film during the new clamping sequence.

We wish to acknowledge helpful discussions with Paul Hough. The computer program was provided by Richard Hogue. Phil Kent made the mechanical changes.

RCS:sls
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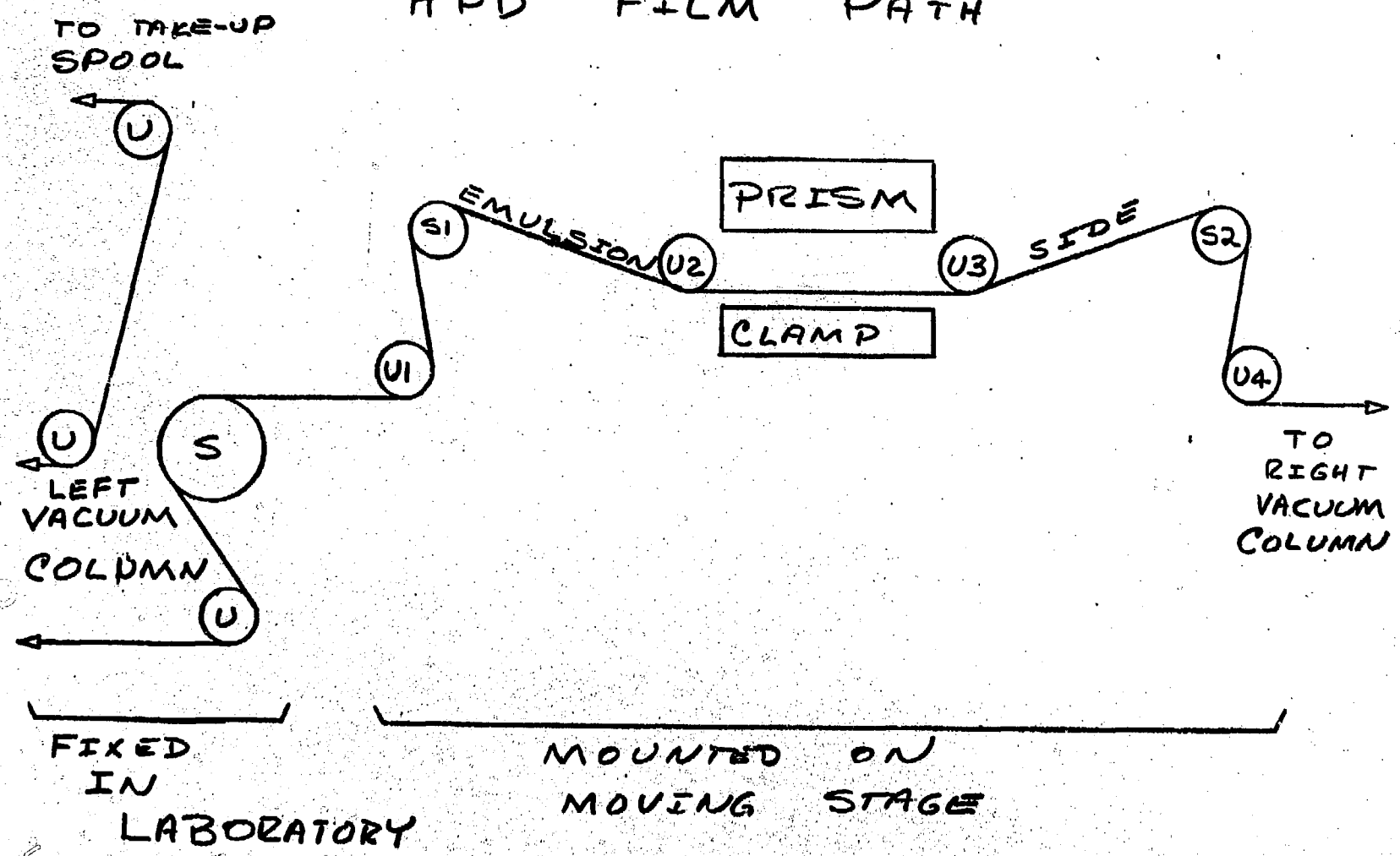
FIGURE 1 MARK II
HPD FILM PATH



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