

## **Nucleic Acid Footprinting of RNA Polymerase**

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Beamline(s): **X28C**

This project is the first studies of the resource designed to probe how specific interactions are established and broken between RNA and DNA polymerases and template DNA. To accomplish this, information from the three dimensional structures of the functional complexes is being combined with detailed kinetic analysis in order to characterize in real time the formation of macromolecular contacts seen in the structure. Dr. Buckle and Buc's research group has applied enzymology, rapid kinetics and photo-crosslinking to the study of *Escherichia coli* RNA polymerase. Dr. Bianca Sclavi, a former member of the CSB, is uniquely qualified to extend these studies of a nucleic acid polymerase to embrace synchrotron footprinting. During the past year Dr. Sclavi has focused on photo-crosslinking and DNase I kinetics studies and is now prepared to utilize the X-28C facility to address two specific questions: First, what additional structural changes accompany opening of the transcription bubble in the transition of RNA polymerase from the "closed" to "open" conformations. Second, what is the mechanism by which RNA polymerase is released from the promoter and completes the initial steps of elongation. These studies will be a model for other nucleic acid polymerizing enzyme systems such as helicases and reverse transcriptases.