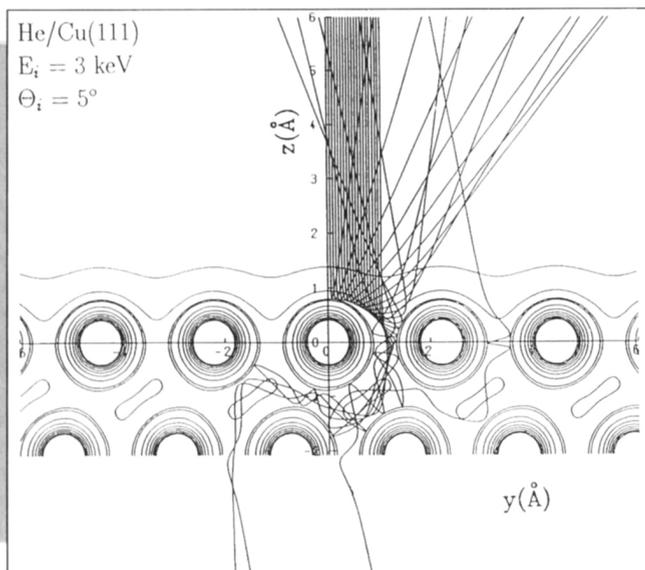


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Once upon a time, there were fifteen helium ions all dashing side-by-side through delightfully unobstructed empty space at precisely identical speeds, three-thousand electron volts worth, to be precise. Little did they know that the distant nearly imperceptible glint, many leagues (or at least microns) in front of them, was a copper crystal laying in wait, its tenuously thin, trigonous (111) surface potential penetrating the void. Our ionized travelers would have whizzed by parallel and unnoticed, none the worse for the minor course correction such distant encounters demand were it not for a mere five-degree navigational error. Instead, they saw looming beneath them the soon-to-be infinite expanse of regularly arrayed copper atoms, each the latent center of a potential scattering cataclysm. It's strange how in the face of such impending calamities events seem to evolve in slow motion and each picosecond stretched into nanoseconds as our wayfarers clung to the vain hope that a glancing reflection of coefficient one from an impenetrable high index direction was in store. Alas, it was not to be. As they descended inextricably toward their fate, they were horrified to realize their perfect alignment with a cavernous [110] axis (investigators later determined it was actually the  $[1\bar{1}0]$ ). And so it was that what had been the epitome of ions in unison was torn asunder. The fortunate among them encountered strings of copper atoms directly and were hurled back into the blackness of space on paths angled far from their closest compatriots—free but evermore alone. Others broke through the interstring potential only to be jostled chaotically through near-surface [110] channels. And a fateful few found the 22.79 electron volt component of their energy perpendicular to the surface was enough to implant them beyond the second layer of copper—an unexplored region comprising either a maze of interstices or another half-infinite void from where no ion has been known to return fully charged. This month's *EDITOR'S CHOICE* is merely an excerpt from a catalog of such adventures and is illustrated here by computer generated plot of the copper atom equipotentials and the various ion trajectories as seen projected onto a plane with normal in the  $[1\bar{1}0]$  direction. To read more of the adventures of glancing ions, including such derring-do deeds as rainbow scattering and hyperchanneling, see D.M. Danailov and K.J. Snowden, "Reflection of Energetic Beams at Glancing Incidence from a Crystal Surface," *Vacuum* **44**, No. 11/12 (1993) p. 1135.

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For more information contact:  
**Mary E. Kaufold**

Manager, Advertising and Exhibits  
Materials Research Society, 9800 McKnight Road,  
Pittsburgh, PA 15237-6006  
Telephone: (412) 367-3036; Fax: (412) 367-4373;  
E-mail: Kaufold@mrs.org