

A design for making a new simple coil trap

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It seems that for some applications we require to decrease the drifting velocity of atomic or molecular beams, and seemingly various methods have been designed to achieve this purpose. I propose to select a relatively big coreless solenoid through which we can give an intense direct (probably impulsive) electric current. Set the whole instrument which is to create the beam in the space interior to the solenoid, and create the beam parallel to the solenoid. There is no magnetic field gradient inside a current-carrying solenoid. So, the drift velocity of the beam is not changed inside the solenoid, but when it is leaving the solenoid its drift velocity decreases. (If we use this method conversely we can increase the drift velocity of the beam.)

Since the effective decelerating region at the opening of a current-carrying solenoid is not so long, it seems that use of cone or (half) saddle-shaped solenoids, as shown in the figures, can extend the effective decelerating region properly, and, depending on the intensity of current, increase the intensity of the magnetic field gradient.

