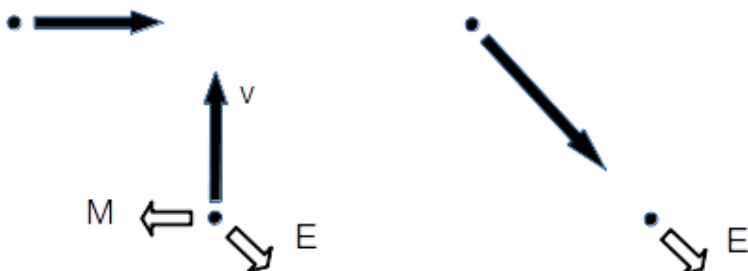


## Frame equivalence

Suppose two small bodies have equal electrical charges. They are moving toward the same point at the same speed of  $v$  along perpendicular paths. The two bodies are represented by small circles in the diagram on the left below:



The forces on one of the bodies are shown. There is a direct electrostatic repulsion,  $E$ , plus a sideways magnetic force  $M$ . Suppose in the left hand diagram the resultant force, and hence the instantaneous acceleration, is in the opposite direction to  $v$ . Using the principle of relativity this body can instead be considered to be at rest, as shown in the diagram on the right. (The velocity  $-v$  has been added to the motions of both bodies.) The lower body now experiences no magnetic force as it lies on the line of motion of the other charged body. So how can the principle of relativity be true if inertial frames are not equivalent?