Field Inspector:

The *Field Inspector* contains the following options for use with fields:

Creating/Removing and Browsing the current Fields:

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The *New Field* button creates and adds another external field to the current list of external fields and displays its default parameter settings. The user can create as many external fields as possible within the memory limits of the machine. An external field is a field that is not a result of inter-particle attraction or repulsion due to their mass or charge. It may in fact be modelling another particle or system of particles which would produce the given field without requiring the user to build such a system of particles to get the desired field.

The *Delete Field* button deletes the current field whose attributes are currently being displayed. If no more fields exist because of this action, certain buttons will become disabled until the *New Field* button again creates a field.

The arrow buttons allow the user to browse the fields and to change the currently displayed field. When the arrows try to move before the first field or after the last field, the inspector wraps around and displays the beginning or end of the list of fields.

Field Attributes:

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When an external field is first created, its default type is gravitational. The user may change this by using the pop-up list to choose between gravitational, electric or magnetic fields. Changing the type of a field does not erase the current values of other properties of the field. They may just simply imply different things (i.e. the force field components).

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Depending upon the type of field that is chosen, text fields exist for entering the field vector components. In the case of the gravitational and electric fields, they have both an x component and a y component. In the case of the magnetic field, the user can only enter a z component of the field so that the simulation stays in the x-y plane given that a magnetic field causes a force perpendicular to a particle's velocity and the field.

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Every external field exists in a certain rectangular region. The default region is set so that it should normally encompass the entire region of the simulation. The origin is the lower left

corner of the region and the width and height values extend the field to the right and upward from the origin. Electric field defined over small ranges make good ideal capacitor simulations, while small regions of magnetic fields lend themselves towards cyclotron simulations.

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If the external field is a gravitational or electric field then in order for *PhysicsWorld* to correctly compute the potential energy of a particle in the field, it must choose a zero value "height" of potential energy. The default value of the zero potential energy height is zero. The user may want to change this default height if, for instance, a particle's initial position is not at a height of zero and the user would like to reference the potential energy from this initial position.

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The color of a field may be set by dragging in a new color using the *Color Panel* found in the *Tools* menu. The default color is clear. If the color is clear, *PhysicsWorld* does not bother to even display the field.

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Even though a field has a specified color, the user may choose to turn off the displaying of an external field by using the display field: switch button. The default is not to display the field, since usually the field may exist everywhere and so it is not usually necessary to "see" the field.

The *OK* button accepts all of the recent changes made to the current field, reinitializes the simulation and closes the Field Inspector panel.