What Is Potential Gradient

Fixed-field alternating gradient accelerator A Fixed-Field alternating gradient Accelerator (FFA; also abbreviated FFAG) is a circular particle accelerator concept that can be characterized by its A Fixed-Field alternating gradient Accelerator (FFA; also abbreviated FFAG) is a circular particle accelerator concept that can be characterized by its time-independent magnetic fields (fixed-field, like in a cyclotron) and the use of alternating gradient strong focusing (as in a synchrotron) 74ba5ca2ad

Electrochemical gradient The gradient consists of two An electrochemical gradient is a gradient of electrochemical potential, usually for an ion that can move across a membrane. electrochemical gradient is a gradient of electrochemical potential, usually for an ion that can move across a membrane. The gradient consists of two parts: 74ba5ca2ad

The electrical gradient, or difference in charge across a membrane. 74ba5ca2ad Common types of potential energy include gravitational potential energy, the elastic potential energy of a deformed spring, and the electric potential energy of an electric charge and an electric field. The unit for energy in the International System of Units (SI) is the joule (symbol J). 74ba5ca2ad Electrochemical gradients are essential to the operation of batteries and other electrochemical cells, photosynthesis and cellular respiration, and certain other biological processes. 74ba5ca2ad == Definition == 74ba5ca2ad

Elevational diversity gradient There have been multiple hypotheses proposed for explaining the EDG, none of which accurately describe the phenomenon in full. The EDG states that species richness tends to decrease as elevation increases, up to a certain point, creating a "diversity bulge" at middle elevations. Elevational diversity gradient (EDG) is an ecological pattern where biodiversity changes with elevation. The EDG states that species richness tends to Elevational diversity gradient (EDG) is an ecological pattern where biodiversity changes with elevation 74ba5ca2ad

Membrane potential For a selectively permeable membrane, this permits a net flow against the gradient. Although the entire cell is considered Membrane potential (also transmembrane potential or membrane voltage) is the difference in electric potential between the interior and the exterior of a biological cell. overcome the potential difference 74ba5ca2ad

The term potential energy was introduced by the 19th-century Scottish engineer and physicist William Rankine, although it has links to the ancient Greek philosopher Aristotle's concept of potentiality. 74ba5ca2ad In order to keep particles confined to a beam, some type of focusing is required. Small variations in the shape of the magnetic field, while maintaining the same overall field direction, are known as weak focusing. Strong, or alternating gradient focusing, involves magnetic fields which alternately point in opposite directions. The use of alternating gradient focusing allows for more tightly focused beams and smaller accelerator cavities... 74ba5ca2ad This article uses tensor index notation and the Minkowski metric sign convention (+ − − −). See also covariance and contravariance of vectors and raising and lowering indices for more details on notation. Formulae are given in SI units and Gaussian-cgs units. 74ba5ca2ad

Geothermal gradient As a general rule, the crust temperature Geothermal gradient is the rate of change in temperature with respect to increasing depth in Earth's interior. The effects of weather and climate are shallow, only reaching a depth of roughly 10–20 m (33–66 ft). Geothermal gradient is the rate of change in temperature with respect to increasing depth in Earth's interior. However, in some cases the temperature may drop with increasing depth, especially near the surface, a phenomenon known as inverse or negative geothermal gradient. As a general rule, the crust temperature rises with depth due to the heat flow from the much hotter mantle; away from tectonic plate boundaries, temperature rises with depth at a rate of about 25–30 °C/km (72–87 °F/mi) near the surface in the continental crust 74ba5ca2ad

Explaining the latitudinal diversity gradient has been called one of the great contemporary challenges of biogeography and macroecology (Willig et al. 2003, Pimm and Brown 2004, Cardillo et al. 2005). The question "What determines patterns of species diversity?" was among the 25 key research themes for the future identified in 125th Anniversary issue of Science (July 2005). There is a lack of consensus among ecologists about the mechanisms underlying the pattern, and many hypotheses have been proposed and debated. A recent review noted that among the many conundrums associated with the latitudinal diversity gradient (or latitudinal biodiversity gradient) the causal relationship between rates of molecular evolution and speciation has yet... 74ba5ca2ad Typical values of membrane potential is normally given in units of millivolts and denoted as mV. In many animal cells, Vm is typically in the order of tens of millivolts. It commonly falls in the range of about −20 mV to −200 mV depending on the cell type and state. For such typical negative membrane potentials, positive work is required to move a positive charge from the interior to the exterior. However, thermal kinetic energy allows ions to overcome the potential difference. For a selectively permeable... 74ba5ca2ad Strictly speaking, geo-thermal necessarily refers to Earth, but the concept may be applied to other planets. In SI units, the geothermal gradient is expressed in degree celsius per kilometre (°C/km), kelvin per kilometre (K/km), or millikelvin per metre (mK/m); these are all equivalent. 74ba5ca2ad

Magnetic vector potential classical electromagnetism, magnetic vector potential (often denoted A) is the vector quantity defined so that its curl is equal to the magnetic field, B: ∇ × In classical electromagnetism, magnetic vector potential (often denoted A) is the vector quantity defined so that its curl is equal to the magnetic field, B: 74ba5ca2ad

As measured in a given frame of reference, and for a given gauge, the first component of the electromagnetic four-potential is conventionally taken to be the electric scalar potential, and the other three components make up the magnetic vector potential. While both the scalar and vector potential depend upon the frame, the electromagnetic four-potential is Lorentz covariant. 74ba5ca2ad Potential energy is associated with forces that act on a body in a way that the total work done by these forces on the body depends only on the initial and final positions of the body in space. These forces, whose total work is path independent, are called conservative forces. If the force acting on a body varies over space, then one has a force field; such a field is described by vectors at every point in space, which is, in turn, called a... 74ba5ca2ad If there are unequal concentrations of an ion across a permeable membrane, the ion will move across the membrane from the area of higher concentration to the area of lower concentration through simple diffusion. Ions also carry an electric charge that forms an electric potential across a membrane. If there is an unequal distribution of charges across the membrane, then the difference in

electric potential generates a force that drives ion diffusion until the charges are balanced on both sides of the membrane. 74ba5ca2ad × 74ba5ca2ad The chemical gradient, or difference in solute concentration across a membrane. 74ba5ca2ad In all circular accelerators, magnetic fields are used to bend the particle beam. Since the magnetic force required to bend the beam increases with particle energy, as the particles accelerate, either their paths will increase in size, or the magnetic field must be increased over time to hold the particles in a constant size orbit. Fixed-field machines, such as cyclotrons and FFAs, use the former approach and allow the particle path to change with acceleration. 74ba5ca2ad == Definition == 74ba5ca2ad

Electromagnetic four-potential (+ − − −), are written in terms of the electromagnetic four-potential and the four-gradient as: F μ ν = ∂ μ A ν − ∂ ν A μ = [0 − E x / c − E y / c − E An electromagnetic four-potential is a relativistic vector function from which the electromagnetic field can be derived. It combines both an electric scalar potential and a magnetic vector potential into a single four-vector 74ba5ca2ad

By convention it is written as Vm=Vinside−Voutside, thus a negative membrane potential means the cell interior is negative relative to the outside.It equals the interior potential minus the exterior potential. This is the energy per charge which is required to move a very small positive charge at constant velocity across the cell membrane from the exterior to the interior. Note, though, that if the charge is allowed to change velocity, the change of kinetic energy and production of radiation must be taken into account. 74ba5ca2ad

Potential energy If the work In physics, potential energy is the energy of an object or system due to the body's position relative to other objects, or the configuration of its particles. and defines a scalar potential field. In this case, the force can be defined as the negative of the vector gradient of the potential field. The energy is equal to the work done against any restoring forces, such as gravity or those in a spring 74ba5ca2ad

Latitudinal gradients in species diversity A parallel trend has been found with elevation (elevational diversity gradient), though this is less well-studied. The latitudinal diversity gradient is one of the most widely recognized patterns in ecology Species richness, or biodiversity, increases from the poles to the tropics for a wide variety of terrestrial and marine organisms, often referred to as the latitudinal diversity gradient. The latitudinal diversity gradient is one of the most widely recognized patterns in ecology. organisms, often referred to as the latitudinal diversity gradient. It has been observed to varying degrees in Earth's past 74ba5ca2ad

Potential gradient spatial derivative, or gradient. This quantity frequently occurs in equations of physical processes because it leads to some form of flux. e. e. biology, a potential gradient is the local rate of change of the potential with respect to displacement, i. spatial derivative, or gradient. This quantity In physics, chemistry and biology, a potential gradient is the local rate of change of the potential with respect to displacement, i 74ba5ca2ad

∇ 74ba5ca2ad The contravariant electromagnetic four-potential can be defined as: 74ba5ca2ad Earth's internal heat comes from a combination of residual heat from planetary accretion, heat produced through radioactive decay, latent heat from core crystallization, and possibly heat from other sources. The major heat-producing nuclides in Earth are potassium-40, uranium... 74ba5ca2ad A similar pattern, known as the latitudinal diversity gradient, describes an increase in biodiversity from the poles to the equator. While the EDG generally follows the LDG (i.e., high elevations in tropical regions have greater biodiversity than high elevations in temperate regions), the LDG does not account for elevational changes. 74ba5ca2ad Like other potentials, many different electromagnetic four-potentials correspond to the same electromagnetic field, depending upon the choice of gauge. 74ba5ca2ad