Kinetic Energy

```
def alt_kinetic_energy(mass, vel):
    n = len(mass)
    kin = 0.0
    for i in range(n):
        vi2 = 0.0
        for k in range(3):
            vi2 += vel[i,k]**2
        kin += 0.5*mass[i]*vi2
    return kin
```

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        for k in range(3):
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        kin += 0.5*mass[i]*vi2
    return kin


def kinetic_energy(mass, vel):
    return 0.5*(mass*(vel**2).sum(axis=1)).sum()
```

Potential Energy

```
def alt_potential_energy(mass, pos, eps2):
    n = len(mass)
    pot = 0.0
    for i in range(n):
        for j in range(i+1,n):
            dr2 = eps2
            for k in range(3):
                dr2 += (pos[i,k]-pos[j,k])**2
            pot -= mass[i]*mass[j]/math.sqrt(dr2)
    return pot
```

Potential Energy

```
def alt_potential_energy(mass, pos, eps2):
    n = len(mass)
    pot = 0.0
    for i in range(n):
        for j in range(i+1,n):
            dr2 = eps2
            for k in range(3):
                dr2 += (pos[i,k]-pos[j,k])**2
            pot -= mass[i]*mass[j]/math.sqrt(dr2)
    return pot

def potential_energy(mass, pos, eps2):
    n = len(mass)
    pot = 0.0
    dx = np.zeros((n,3))
    for i in range(n):
        dx[i+1:] = pos[i+1:] - pos[i]
        dr2 = (dx[i+1:]**2).sum(axis=1) + eps2
        pot -= mass[i]*(mass[i+1:]/np.sqrt(dr2)).sum()
    return pot
```