A. EINSTEIN,
112 MERCER STREET,
PRINCETON,
NEW JERSEY, U.S.A.

October 26, 1946
Rec'd Oct. 27
Ansrd same even[ng]
(5 pp., criticizes $E = mc^2$ formula)[1]

Dear Mr. Silberstein,

Your question can be answered from the $E = mc^2$ formula, without any erudition. If E is the energy of your system consisting of the two masses, E_0 the energy of the masses when they approach infinite distance, then the system's mass defect is

$$\frac{E_0 - E}{c^2}$$

In your case, $(E_0 - E)_{pot} = \kappa \frac{m^2}{r}$. On account of the kinetic energy, however, the total energy deficit is only half as large, in accordance with the virial theorem.[2] Therefore, if M is the mass of the total system,

$$2m - M = \frac{1}{2} \frac{\kappa}{c^2} \frac{m^2}{r}$$

on the first[3] approximation, that is, if the influence of the finiteness of the radius of the masses is ignored.

I am convinced that this (or a formula corrected with respect to the radius of the masses) cannot help in shedding light on atomic constants. For that one must first have a theory that contains[4] the correct unification[5] of gravitation and electricity.

Sincere greetings from your

A. Einstein

---

[1] Translator's note: These five lines are in English in the original.
[2] Translator's note: Another hand has written "virial theorem" a second time above Einstein's text, probably because of difficulty reading his handwriting.
[3] Translator's note: "First" is corrected above the line from "desired."
[4] Translator's note: Another hand has written "contains" a second time below Einstein's text, probably because of difficulty reading his handwriting.
[5] Translator's note: Another hand has written "= the correct union [*Verbindung*] (?)" below Einstein's text, probably as an attempt to read his handwriting for what I read as "the correct unification [*Vereinigung*]."