Fermat and the Circle

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The Binomial Expansion yields the result:

$c^n = a^n + b^n + rem(a,b,n)$ where rem(a,b,n)> 0

This by itself proves Fermat's Theorem for a,b, and c integers and n >2

(for n = 2, the expression can be that of a circle if a,b,c form a Pythagorean triple; otherwise the Binomial Theorem applies.

If Fermat's expression were true, $c^n = a^n + b^n$, it would mean that rem(a,b,n)= 0.

Since Rem(a,b,n) consists of additive terms which are all composed of multiplicative products of a and b (e.g. $a^n b^m$) , it can only vanish if a=0 or b=0, so that $c^n = b^n$ or $c^n = a^n$, respectively.

Since the Binomial Theorem is valid all numbers (e.g. fractions, transcendentals, and complex numbers), the question of whether a and b are integers is moot - it is the remainder term that must vanish.

For the relativistic circle in two dimensions (a,b) positive numbers are generated in the positive quadrant of the circle by the prescription $\gamma = 1$ when $\beta = 0$, and vice versa, so that

$n = n\gamma$ or $m = m\beta$ at $\theta = 0$ or $\theta = \frac{\pi}{2}$ at v=c, respectively.

(for v=0, $\gamma = 1$, $\gamma = \frac{1}{\sqrt{1-\beta^2}}$, $\beta = \frac{v}{c}$, but at $\theta = 0$, $\beta = 0$, $\gamma = 1$, so $a = a\gamma$ for each integer generated represented by a, and $na = na\gamma$.

(for v = c, $\gamma = 0$, $\beta = 1$, and $b = b\beta$ for each integer b.

The product $\beta\gamma$ can be thought of as the area of either a concentric circle or the diagonal of an inscribed polygon, where the area of its equivalent square is $\sqrt{2}$

For $\beta < 1$, the product $\gamma\beta$ cannot be an integer, since $(\gamma\beta) < 1^2$, corresponding to the result of the Binomial Expansion of $n(1^n) = n(\gamma^n + \beta^n)$, since $1^2 = \gamma^2 + \beta^2$

For $\beta > 1$ the corresponding expression is $\gamma^2 = 1^2 + (\beta\gamma)^2$ which can only be valid for $\gamma = 1$ and $\beta\gamma = 0$ (i.e., $\beta = 0$)

(For QFT, it is instructive to think of $\beta = h$ and/or $\gamma = h$, where h is Planck's constant).