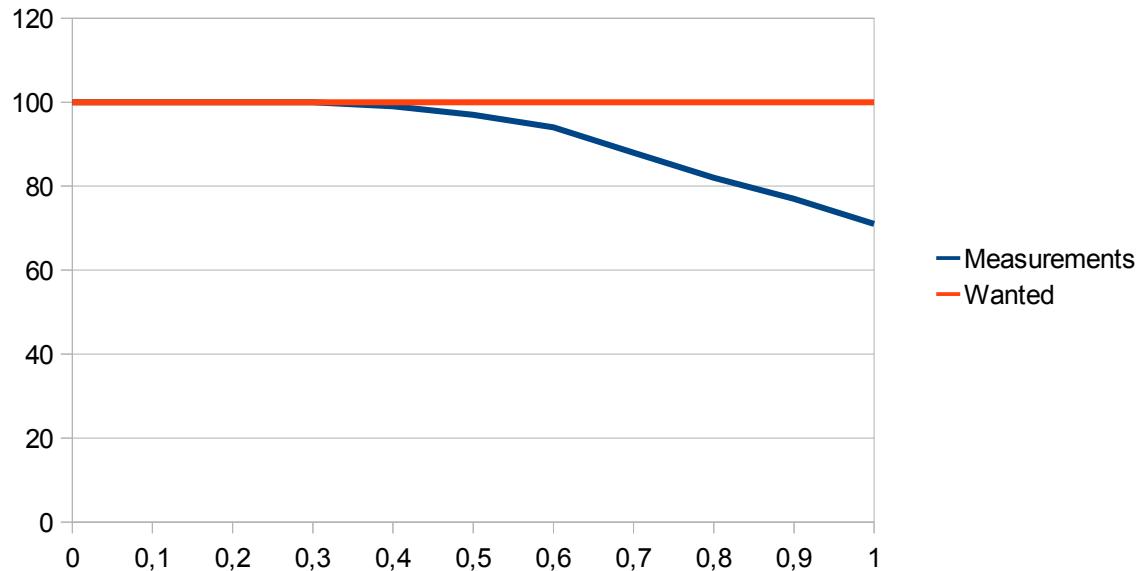


Approximation for brightness- correction- curves for Beckmann and GGX (to be used to create a gloffuse/difllossy- shader):

Measured data from an evenly lit white(`ffffff`) Beckmann- Surface:
x- axis: roughness- value; y- axis: brightness- value (in percent):



*"wanted" indicates that we would like to have 100% brightness at any given roughness- value.

Let's try to approximate that curve the same way we did it for the Ashikhmin- Shirley- surface:

$$f(x) = ax^3 + bx^2 + cx + d$$

$$f'(x) = 3ax^2 + 2bx + c$$

$$\begin{aligned} f(0) &= a(0)^3 + b(0)^2 + c(0) + d = 100 \\ \Rightarrow d &= 100 \end{aligned}$$

$$\begin{aligned} f'(0) &= 3a(0)^2 + 2b(0) + c = 0 \\ \Rightarrow c &= 0 \end{aligned}$$

$$\begin{aligned} f(1) &= a(1)^3 + b(1)^2 + 0 + 100 = 71 \\ \Rightarrow a + b &= -29 \end{aligned}$$

$$\begin{aligned} f(0.5) &= a(0.5)^3 + b(0.5)^2 + 0 + 100 = 97 \\ \Rightarrow 0.125a + 0.25b &= -3 \end{aligned}$$

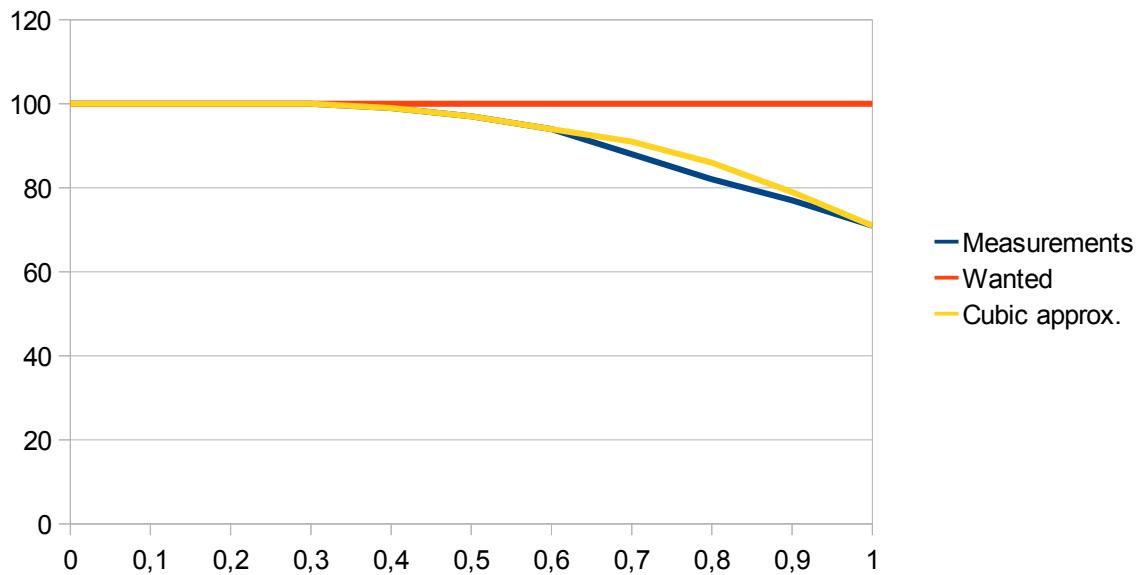
$$Eq1: a + b = -29$$

$$Eq2: 0.125a + 0.25b = -3$$

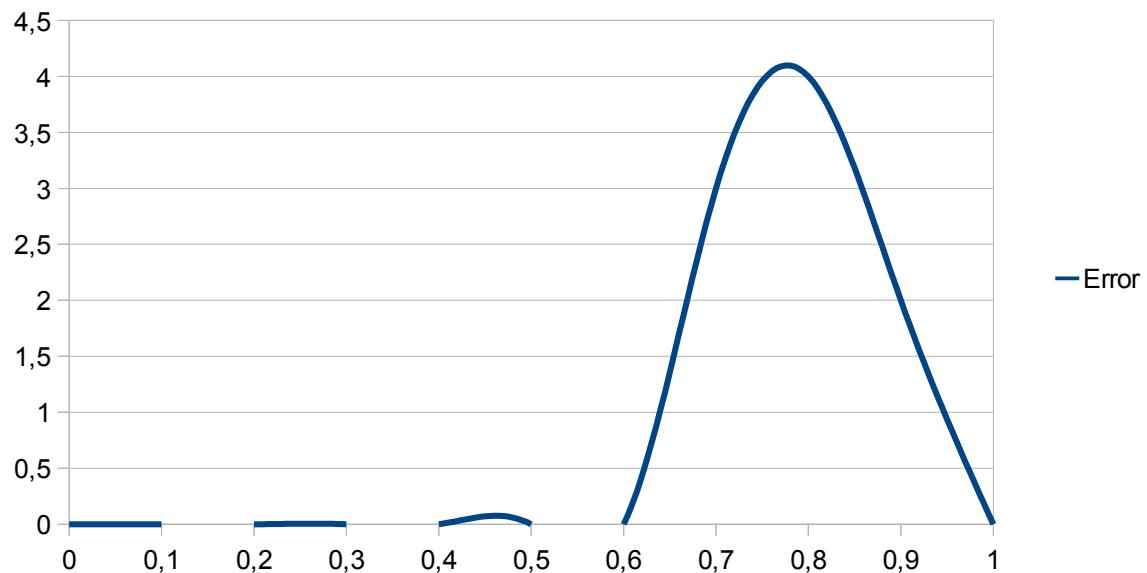
$$\Rightarrow a = -34; b = 5;$$

$$\Rightarrow f(x) = -34x^3 + 5x^2 + 100$$

Let's see how well this approximation does:

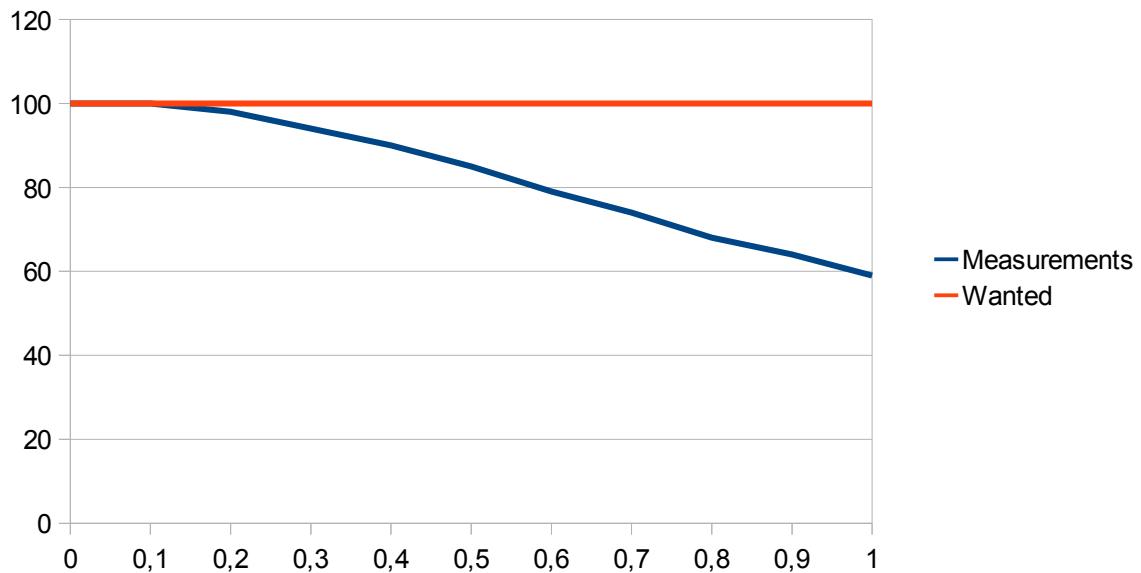


This looks decently accurate.



This result is pretty decent. Let's use this function in the brightness-correction-node-setup and let's do the same thing for GGX now.

This is what the Measurements from the GGX- surface look like:



Let's approximate that:

$$f(x) = ax^3 + bx^2 + cx + d$$

$$f'(x) = 3ax^2 + 2bx + c$$

$$\begin{aligned} f(0) &= a(0)^3 + b(0)^2 + c(0) + d = 100 \\ \Rightarrow d &= 100 \end{aligned}$$

$$\begin{aligned} f'(0) &= 3a(0)^2 + 2b(0) + c = 0 \\ \Rightarrow c &= 0 \end{aligned}$$

$$\begin{aligned} f(1) &= a(1)^3 + b(1)^2 + 0 + 100 = 59 \\ \Rightarrow a + b &= -41 \end{aligned}$$

$$\begin{aligned} f(0.5) &= a(0.5)^3 + b(0.5)^2 + 0 + 100 = 85 \\ \Rightarrow 0.125a + 0.25b &= -15 \end{aligned}$$

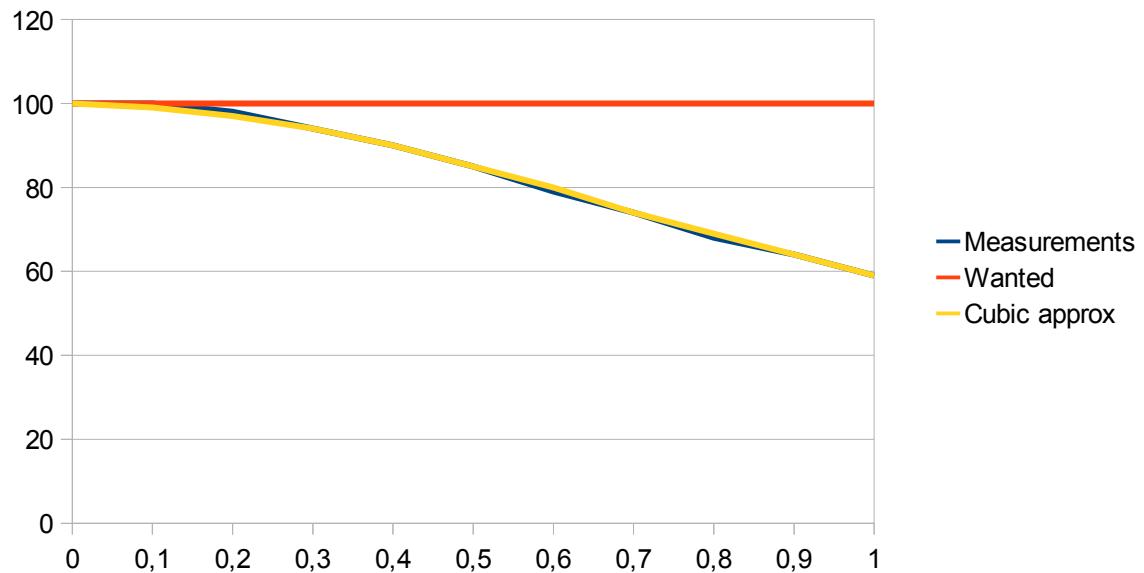
$$Eq1: a + b = -41$$

$$Eq2: 0.125a + 0.25b = -15$$

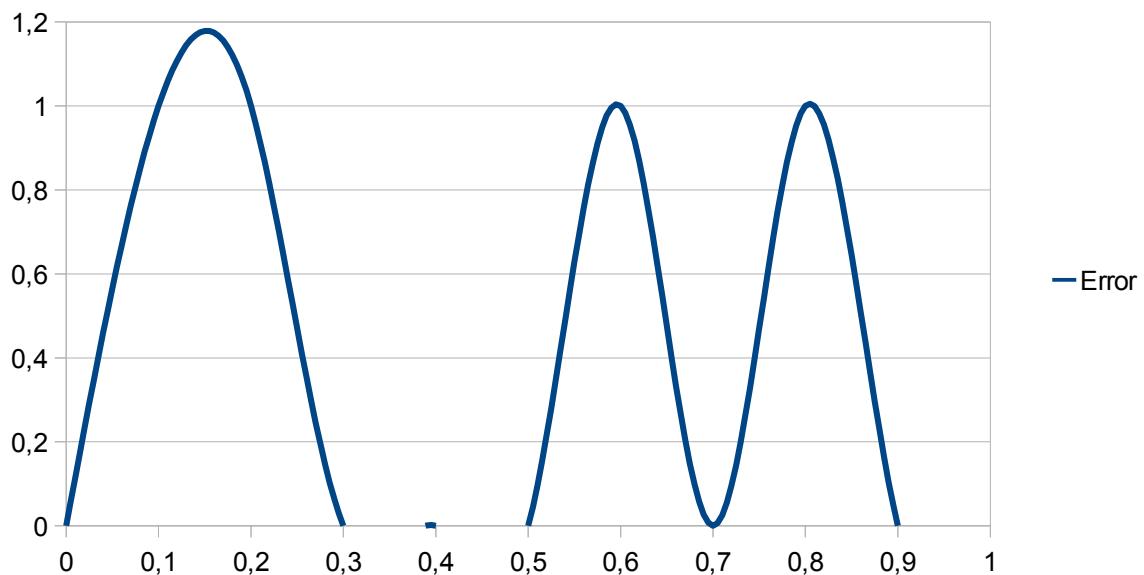
$$\Rightarrow a = -34; b = 5;$$

$$\Rightarrow f(x) = 38x^3 - 79x^2 + 100$$

Let's see how that looks:



Beautiful!



Now i will use these functions to build a node- setup in Blender and run some test.