

$x+x=0 \quad x=-x$
 und \mathbb{Z}_2
 binäres Zahlensystem n : $01011\dots110$
 $\ell=3 \dots 8$ Körner
 $n=5 \dots 32$ Richtige Körner \Rightarrow 24 Messungen
 $\begin{bmatrix} 000 & 00 \\ 00 & 01 \\ \vdots & \vdots \end{bmatrix}$ kein reiner Fehler 00001

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$010 \sim b_0 + b_1x + b_2x^2$
 $m(x)$
 $p(x) = 1 + x^2 + x^3 = a_0 + a_1x + a_2x^2 + a_3x^3$
 $3 = n - 6$ dabei $(n, 6)$ - Euklid, $\text{ggT}(6, 3)$
 Erweitern: $m(x) \rightarrow \frac{x^{n-6} \cdot m(x)}{x^{n-6}} = b_0x^{n-6} + b_1x^{n-5} + b_2x^{n-4}$
 $\begin{bmatrix} 1 & 1 & 0 & 1 & 0 & 0 \end{bmatrix} \xrightarrow{-x^3} \tilde{m}(x) = p(x) = q(x) \cdot p(x) + r(x)$
 $\tilde{m}(x) = (0 \cdot x^3 + 1 \cdot x^2 + 0 \cdot x^1) : p(x)$ $\text{deg} < 3$
 $x^2 : (1 + x^2 + x^3) = (x+1)$
 $\frac{x^2 + x^2 + x}{x^2 + x^2 + 1} \Rightarrow \tilde{m}(x) = (x+1) \cdot p(x) + 1 + x + x^2$

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$(1+x+x^2+x^3) : (1+x^2+x^3) = x+1$ ✓
 $\frac{x+x^2+x^3}{1+x^2+x^3}$
 $r(x)$ ist das Restglied $\boxed{1+x}$ $\Leftrightarrow r(x) = 0$
 $p(x) = 1+x+x^2$
 $m(x) = b_0 \quad \tilde{m}(x) = x^2 \cdot b_0$
 $x^2 : (x^2+x+1) = 1$
 $\frac{x^2+x+1}{x^2+x+1}$
 $x+1$

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$(\mathbb{Z}_2)^k \rightarrow (\mathbb{Z}_2)^m$
 $\begin{pmatrix} \vdots \\ \vdots \\ \vdots \\ \vdots \end{pmatrix} \begin{pmatrix} a \\ b \\ \vdots \\ 0 \end{pmatrix} = \begin{pmatrix} \vdots \\ \vdots \\ \vdots \\ \vdots \end{pmatrix}$
 Erweitern

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$p(x) = 1 + x^2 + x^3$
 $m(x) = \begin{cases} x^i \rightarrow \mathbb{Z} = x^i \\ x^j \rightarrow \mathbb{Z} = x^j \end{cases}$
 $(6, 3)$ - Euklid
 $x^3 : (x^2+x+1) = 1$
 $\frac{x^3+x^3+x}{x^2+x+1} = x^2+x+1$
 $\frac{x^2+x+1}{x^2+x+1} = 1$
 $\frac{x^2+x+1}{x^2+x+1} = 1$
 $\frac{x^2+x+1}{x^2+x+1} = 1$
 $\frac{x^2+x+1}{x^2+x+1} = 1$
 $G = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & 1 \\ 1 & 1 & 0 \\ \vdots & \vdots & \vdots \\ 0 & 0 & 1 \end{bmatrix}$
 $H = \begin{bmatrix} 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 \\ \vdots & \vdots & \vdots & \vdots & \vdots & \vdots \end{bmatrix}$
 matrix linking part
 $\begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix} \checkmark$

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$m \mapsto G \cdot m \mapsto H \cdot (G \cdot m) = (H \cdot G) \cdot m$
 $H \cdot G = (E_{n-6} \quad P) \cdot \begin{pmatrix} P \\ E_6 \end{pmatrix} = E_{n-6} \cdot P + P \cdot E_6 = P + P = 0$
 $p(x) = 1+x \quad (n, n-1)$ Euklid $m_i = x^i \quad i=0, \dots, n-2$
 $G = \begin{pmatrix} 1 & 1 & \dots & 1 \\ 1 & 0 & \dots & 0 \\ 0 & 1 & \dots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \dots & 1 \end{pmatrix} \quad H = \begin{pmatrix} 1 & 1 & \dots & 1 \\ 1 & 0 & \dots & 0 \\ \vdots & \vdots & \ddots & \vdots \\ 0 & 0 & \dots & 1 \end{pmatrix}$

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