

Diagram illustrating the syndrome calculation in a linear code:

The parity check matrix $H_{m \times n}$ (Parity checks) is multiplied by the code vector $c_{n \times 1}$ (code vector) and the error vector e (error vector, K -sparse).

The resulting syndrome vector $y_{m \times 1}$ (Syndromes/ Observations/ Sketch) is calculated as:

$$H_{m \times n} \times \begin{pmatrix} c_{n \times 1} \\ e \end{pmatrix} = 0 + y_{m \times 1}$$

The error vector e is K -sparse, meaning it contains at most K non-zero elements (indicated by green blocks).